Faculty of Computing, Health and Science

Centre for Exercise and Sports Science Research (CESSR)

Annual Report 2009

Brief Overview

The Centre for Exercise and Sports Science Research (CESSR) was established in 2007 upgraded from the Level 1 Exercise and Sports Science Research Group (ESSRG) formed in 2000. Thus, this is the third annual report of the CESSR (the first report of the CESSR was for 2007). The CESSR aims 1) to foster high quality research in exercise and sports science at ECU; 2) to promote and enhance the teaching of exercise and sports science at ECU; 3) to attract and support honours and postgraduate students; 4) to establish collaborative links with other research groups and institutes; 5) to attract research funding from competitive grant agencies and industry; and 6) to contribute to exercise and sports science needs at local, national and international levels. We achieved all of the aims, and had another successful year in 2009.

Research conducted by the members of the CESSR continued to build during 2009. In 2009, our members (15 full-time academic staff at ECU, 26 PhD, 16 Masters by Research, and 3 Honours students) published 66 refereed journal articles and 3 book chapters, made 36 conference presentations, and obtained research grants worth over $1,000,000. We have been striving to improve the outcomes and achieve the aims at higher levels in 2010.

MEMBERSHIP

The members of the CESSR are consisted of all full-time academic staff and research students of the Exercise and Sports Science discipline in the School of Exercise, Biomedical and Health Sciences, and its adjunct members. It should be noted that members are changing, because some members leave ECU, and new members come. In 2009, we lost two active members; Associate Professor Paul Laursen and Dr. Mike McGuigan, both moved to New Zealand, but remain as adjunct members. Dr. Chris Abbiss joined us as a lecturer to replace Paul, and Dr. Jodie Cochrane joined us as a lecturer to replace Dr. Jane Dundas. We had 26 PhD, 16 Masters by Research and 3 Honours students in 2009.

Academic staff members

Professor Ken Nosaka
CESSR coordinator, Postgraduate course coordinator

Professor Robert Newton
Director of Vario Health Institute

Associate Professor Barry Gibson
Head of School of Exercise, Biomedical and Health Sciences

Associate Professor Angus Burnett

Associate Professor Anthony Blazevich

Dr. Mike Newton

Dr. Greig Watson

Dr. Nikola Medic

Dr. Jodie Cochrane

Dr. Chris Abbiss

Dr. Daniel A. Galvão
Postdoctoral research fellow

Dr. Jeremiah Peiffer
Postdoctoral research fellow

Kylie Cormack
Undergraduate Course Coordinator, Practicum Coordinator

Fiona Iredale

Barbara Howard

Adjuncts

Professor William Kraemer (University of Connecticut)

Professor Michael Stone (USOTC)

Professor Bonnie Berger (Bowling Green State University)

Professor John Cronin (Auckland University of Technology)

Professor Paul Laursen (Auckland University of Technology)

Associate Professor Mike McGuigan (Auckland University of Technology)

Dr. Elizabeth Rose (Honorary Senior Lecturer, Edith Cowan University)

Technical staff

Jack Burns

Nadija Vrdoljak

PhD Students and their Research Projects (Supervisors)

1. Abdulaziz Al Dayel: Comparison between pulsed current and alternating current in electrical muscle stimulation for muscle function, damage and hormonal responses (Mike McGuigan, Ken Nosaka)
2. Warren Andrews: Injury risk and functional status of the hamstring muscles: Effects of fatigue under game conditions and evaluation of prophylactic conditioning programmes (Rob Newton)
3. Jacob Earp: Training specific adaptations to slow high load and fast light load resistance training and their expression in performance (Rob Newton, Anthony Blazevich, Plue Cormie)
4. Tugay Esgin: To be determined (Rob Newton, Mike Newton)
5. Zoe Gibbs: Effects of aerobic and resistance exercise in breast cancer patients during radiotherapy- A randomised controlled trial (Rob Newton, Daniel Galvao)
6. Keir Hansen: Maximising explosive force-time and power-time loading parameters (John Cronin, Mike Newton)
7. Stuart Karppinen: To be determined (Rob Newton)
8. Wing Yin Lau: Mechanisms of delayed onset muscle soreness (Ken Nosaka, Anthony Blazevich, Mike Newton)

9. Kristie Lee-Taylor: Using critical flicker fusion and kinetic data to predict readiness for training (John Cronin, Mike Newton)
10. Gregory Levin: To be determined (Rob Newton, Daniel Galvao)
11. Joseph Mate: Heat stress in mining industry: A practical approach to reducing heat strain in miners (Paul Laursen, Greig Watson, Jacques Oosthuizen)
12. Nur Ikhwan Mohamad: Kinematics and kinetics associated with hypertrophy training (John Cronin, Ken Nosaka)
13. Lynda Murray: Effects of peripheral sensory inputs on cortical responses to spike timing dependent plasticity (Ken Nosaka, Gary Thickbroom)
14. Mark Muthalib: Effects of exercise-induced muscle damage on muscle microcirculation investigated by near infrared spectroscopy (Ken Nosaka, Guillaume Millet)
15. Marika Noorkoiv: Factors affecting isometric force-length relationship (Anthony Blazevich, Ken Nosaka)
16. Amanda Overton: Neuromuscular fatigue and kinematics during constant workload high-intensity endurance exercise (Anthony Blazevich, Chris Abbiss)
17. Nick Powlas: A series of studies investigating the use of post activation potentiation during complex training to enhance strength and power (Rob Newton)
18. Debra Perich: Low back pain in schoolgirl rowers: Prevalence, bio-pscho-social factors and intervention (Angus Burnett)
19. Steve Pratt: Nutrition and physical activity programs for cancer patients (Rob Newton)
20. Marc Quod: Mathematically modelling the training and performance power outputs of elite cyclists (Paul Laursen)
21. Megan Ross: Pre-cooling and elite cycling time trial performance in the heat (Paul Laursen, Chris Abbiss)
22. Rodney Siegel: The role of exercise in reversing treatment toxicities in prostate cancer patients (Paul Laursen, Ken Nosaka, Greig Watson)
23. Favil Singh: Feasibility of a pre-operative exercise intervention in prostate and colon cancer survivors (Rob Newton, Daniel Galvao)
24. Alastair Stewart: Self-perceptions and motivation changes with a behavioural intervention versus a self-managed program in older adults: The PATH Study (Elizabeth Rose)
25. Joanne Trezise: Anatomical and physiological factors influencing force production capabilities (Anthony Blazevich)

26. Bradley Wall: The role of exercise in reversing treatment toxicities in prostate cancer patients (Rob Newton, Daniel Galvao)

Masters by Research Students and their Research Projects (Supervisors)

1. Roy Yan Han Chan: Influence of Eccentric Training Variation on Muscle Damage and Adaptation of the Elbow Flexors (Ken Nosaka, Mike Newton)
2. Melissa deKlerk: The influence of hip abductor fatigue on the level of non-contact ACL injury risk in sub-elite and recreational Australian netball players (Ken Nosaka, Jodie Cochrane)
3. Richard Garrad: Systemic and muscle oxygen consumption in maximal and submaximal concentric and eccentric contractions of the elbow flexors (Ken Nosaka)
4. Sandra Hill-Williamson: Are performance tests able to effectively discriminate between elite, sub-elite and recreational level youth soccer players? (Mike Newton, Ken Nosaka)
5. Julian Jones: To be determined (Rob Newton)
6. Chris Joyce: Examination of trunk kinematics and their relationship to ball velocity in low handicap male and female golfers using a Modern swing (Angus Burnett)
7. Benjamin Kan: Effect of transcranial direct current stimulation (tDCS) on corticomotor excitability and muscular endurance of the elbow flexors (Ken Nosaka, Jane Dundas)
8. Dom Passalacqua: Trunk kinematics in static and dynamic balance control: An examination of proximal to distal sequencing and centre of pressure (Angus Burnett)
9. Roger Pegoraro: The validity and reliability of a fatiguing protocol to induce exercise-associated muscle cramp (Paul Laursen, Ken Nosaka, Greig Watson)
10. Ben Piggott: The relationship between training load and the incidence of injury and illness over a pre-season at an Australian Football League Club (Mike McGuigan, Mike Newton)
11. Samuel Robertson: Reliability, validity and kinematics of the nine-ball skills test: A comparison of professional, high-level amateur and mid-handicap male golfers (Angus Burnett)
12. Sam Goh Shi Shien: Effects of lower body compression garments (Skins^{TM}) on submaximal and maximal running performance in hot and cold conditions in male recreational runners (Paul Laursen, Ken Nosaka)

13. Kyle Smith: Keeping the aged Healthy, happy and independent through physical and cognitive exercise (Darryl Turner, Rob Newton)
14. Julia Skleryk: Effects of 10 versus 30 second repeated sprints on glucose tolerance and insulin sensitivity in healthy adult males. (Greig Watson, Paul Laursen)
15. Ben Thomasian: The effect of vertical or horizontal plyometric exercise on sprint performance, and muscle architecture and function (Anthony Blazevich, Jodie Cochrane)
16. Wei Peng Teo: The effects of circadian rhythmicity on force production, power output and salivary cortisol response (Mike McGuigan, Mike Newton)

Honours students and their Research Projects (Supervisors)

1. Michael Barker: Comparison of unassisted single-leg, assisted single-leg and two-legged cycling (Chris Abbiss, Paul Laursen)
2. Vivien Marsie: Variation in muscle size when compared to $p70^{S6k}$ levels after a resistance exercise bout in a homogeneous population. (Anthony Blazevich)
3. Willy Wing Kuen Wee: An examination of high-level junior Singaporean sailors: An injury survey and biomechanical analysis of hiking (Angus Burnett)

GRANTS AWARDED

In 2009, we had a total of $878,408 from external funding, and $123,501 from internal funding, and the total amount exceeded $1,000,000.

External Funding

Abbott Australasia – Amount $173,054
Lucrin Immediate Exercise Trial.
Newton, R.U., Cormie, P. and Galvão, D.A.

Abbott Australasia – Amount $50,600
Lucrin Exercise Support Program.
Newton, R.U. and Galvão, D.A.

Australian Huntington Disease Association (Inc) WA – Amount $350,000
The Effects of Environmental Enrichment on Clinical Measures of Disease Progression and Quality of Life for Patients with Huntington's Disease.
Ziman, M., Thompson, J., Girdler, S., and Newton, R.U.

Australian Institute of Sport (AIS) – Amount $39,600
Motion capture system to determine in-competition bike set-up in elite cyclists.
Blazevich, A.J. and Abbiss C.R.

Australian Institute of Sport Collaborative Research Funding – Amount $27,100
Longitudinal monitoring of factors influencing fatigue, recovery and performance of elite cyclists.
Abbiss C.R., Halson S., Garvican L., Hayes D., Barnes C., Buckley B., Blanch P., Clements M., Jeacocke H., Martin D.T.

Department of Health Government of Western Australia – Amount $10,000
New Independent Researcher Infrastructure Support Award
Galvão, D.A.

International Cricket Council. – Amount $46,600
Standardisation of the ICC illegal action protocol.
Burnett, A., Elliott, B., Alderson, J., King, M., Portus, M., Spratford, W., and Ranson, C.

Physiotherapy Research Foundation – Amount $8,400
Efficacy of a specific physiotherapy exercise intervention to alter spinal kinematics and reduce low back pain in adolescent male rowers.
Ng, L., O'Sullivan, P., and Burnett, A.

Internal Funding

Edith Cowan University, Faculty of Computing, Health and Sciences Small Grant Scheme – Amount $9,738
Does the intensity of resistance exercise impact lymphedema in breast cancer survivors.
Cormie, P., and Newton, R.U.

Edith Cowan University, Faculty of Computing and Health Sciences Small Grant Scheme – Amount $9,920.
Efficacy of a counterweighted single-leg cycle training programme for improving skeletal muscle respiratory capacity.
Abbiss, C.R., Martin, J., Quod, M.J., Martin, D.T., Hawley, J.A., and Laursen, P.B.

Research Infrastructure Block Grant – Amount $103,843.
Acquisition of Repetitive magnetic stimulator system – MagStim Rapid Stimulator
Blazevich, A.J., Nosaka, K. et al.

PUBLICATIONS

In 2009, our members published 3 book chapters and 66 referred journal articles, and made 36 conference presentations.

Book Chapter

1. Lloyd, D. G., Ackland, T. R., and Cochrane, J. L. Balance and Agility in Sport. In: Applied Anatomy and Biomechanics in Sport, 2nd Edition: Blackwell, 2009.

2. Medic, N. Understanding masters athletes' motivation for sport. In: J. Baker, S., Horton & P. Weir (Eds.). The masters athlete: Understanding the role of sport and exercise in optimizing aging (pp. 105-121). New York: Routledge. 2009.

3. Nosaka, K. Muscle damage and adaptation induced by lengthening contractions. Pp. 415-435, In: Advances in Neuromuscular Physiology of Motor Skills and muscle Fatigue (Ed. Shinohara, M.) Research Signpost. Karela, India. ISBN: 978-81-308-0365-4. 2009.

Journal Articles

1. Abbiss, C.R., and Laursen, P.B. Do changes in heat storage mediate an anticipatory regulation of exercise intensity? Journal of Applied Physiology,. 107(2): 632-633, 2009.

2. Abbiss, C.R., Peiffer, J.J., and Laursen, P.B. Optimal cadence selection during cycling. International Journal of Sports Medicine, 10(1): 1-15, 2009.

3. Abbiss, C.R., Peiffer, J.J., Wall, B.A., Martin, D.T., and Laursen, P.B. Influence of starting strategy on time trial performance in the heat. International Journal of Sports Medicine, 30(3): 188-193, 2009.

4. Abbiss, C.R., Quod, M.J., Levin, G., Martin, D.T., and Laursen, P.B. Accuracy of the Velotron cycle ergometer and SRM Power Meter. International Journal of Sports Medicine, 30(2): 107-112, 2009.

5. Aisbett, B., LeRossignol, P., McConell, G., Abbiss, C.R., and Snow, R. Influence of all-out fast-start pacing strategies on 5-minute cycling time trial performance. Medicine & Science in Sport & Exercise, (Epub; Sep, 2009).

6. Aisbett, B., LeRossignol, P., McConell, G., Abbiss, C.R., and Snow, R. Effects of starting strategy on 5-minute cycling time-trial performance. Journal of Sports Sciences, 27(11): 1201-1209, 2009.

7. Aldayel, A., Jubeau, M., McGuigan, M.R., and Nosaka, K. Less indication of muscle damage in the second than initial electrical muscle stimulation bout consisting of isometric contractions of the knee extensors. European Journal of Applied Physiology, 108: 709–717, 2010.

8. Aoun, S., Osseiran-Moisson, R., Collins, F., Newton, R., and Newton, M. A self-management concept for men at the community level: The 'waist' disposal challenge. The Journal of Health Psychology, 14(5): 663-674, 2009.

9. Baker, D.G. and Newton, R.U. Effect of kinetically altering a repetition via the use of chain resistance on velocity during the bench press. Journal of Strength and Conditioning Research, 23(7): 1941–1946, 2009.

10. Blazevich, A.J., Cannavan, D., Horne, S., Coleman, D.R. and Aagaard, P. Changes in muscle force-length properties affect the early rise of force in vivo. Muscle & Nerve, 39: 512-520, 2009.

11. Blazevich, A.J., Cannavan, D., Horne, S. and Coleman. Anatomical predictors of maximum isometric and concentric knee extensor moment. European Journal of Applied Physiology, 105: 869-878, 2009.

12. Bell, J.A. and Burnett, A. (2009). Exercise for the primary, secondary and tertiary prevention of low back pain in the workplace: A systematic review. Journal of Occupational Rehabilitation, 19: 8-24, 2009.

13. Brughelli, M., Cronin, J., and Nosaka, K. Muscle architecture and optimum angle of the knee flexors and extensors: A comparison between cyclists and Australian Football players. Journal of Strength and Conditioning Research, 24(3): 717–721, 2010.

14. Brughelli, M., Nosaka, K., Carter, S., and Cronin, J. Application of eccentric exercise after multiple hamstring injuries of an Australian Football player with recurrent hamstring injuries. Physical Therapy in Sport, 10: 75-80, 2009.

15. Brughelli, M., Cronin, J., and Nosaka, K. Contralateral leg deficits in kinetics and kinamatic variables during running in Australian Rules football players with previous hamstring injuries. Journal of Strength and Conditioning Research, 2009 Nov 26 [Epub ahead of print]

16. Bryant, A., Newton, R.U., and Steele, J. Successful feed-forward strategies following ACL injury and reconstruction. Journal of Electromyography and Kinesiology, 19(5): 988-997, 2009.

17. Buchheit, M., Al Haddad, H., Millet, G.P., Lepretre, P.M., Newton, M., and Ahmaidi, S. Cardiorespiratory and cardiac autonomic responses to 30-15 intermittent fitness test in team sport players. Journal of Strength and Conditioning Research, 23(1), 93-100, 2009.

18. Buchheit, M., Cormie, P. Abbiss, C., Ahmaidi, S., Nosaka, K., and Laursen, P.B. Muscle deoxygenation during repeated sprint running: Effect of active vs. passive recovery. International Journal of Sports Medicine, 30: 418-425, 2009.

19. Buchheit, M., Peiffer, J.J., Abbiss, C.R., and Laursen, P.B. Effect of cold water immersion on postexercise parasympathetic reactivation. American Journal of Physiology – Heart and Circulation Physiology, 292(2): H421-427, 2009.

20. Burnett, A.F., O'Sullivan, P., Caneiro, J-P., Krug, R., Bochmann, F. and Helgestad, G-W. An examination of the flexion-relaxation phenomenon in the cervical spine in lumbo-pelvic sitting. Journal of Electromyography and Kinesiology, 19: E229-E236, 2009.

21. Burnett, A.F., Sze, N., Tam, C., Yeung, C., Leong, M., Wang, W., Tan, B-K and O'Sullivan, P. A cross-cultural study of the back-pain beliefs of female undergraduate healthcare students. Clinical Journal of Pain, 25: 20-28, 2009.

22. Caneiro, J-P., O'Sullivan, P. Burnett, A., Barach, A., O'Neil, D., Tveit, O. and Olafsdottir, K. The influence of different sitting postures on head/neck posture and muscle activity. Manual Therapy, 15: 54-60, 2010.

23. Chapman, D., Newton, M., and McGuigan, M. Efficacy of interval based training on conditioning of amateur field hockey players. Journal of Strength and Conditioning Research, 23(3): 712-717, 2009.

24. Chapman, D., Newton, M., McGuigan, M., and Nosaka, K. Effect of a slow velocity eccentric exercise on muscle damage induced by fast velocity eccentric exercise. Journal of Strength and Conditioning Research, 2009 Dec 4 [Epub ahead of print]

25. Chen, T.C., Chen, H-L., Lin, M-R., Wu, C-J., Chung, C-J., Nosaka, K. Responses to four eccentric exercise bouts of the elbow flexors performed every four weeks. European Journal of Applied Physiology, 106: 267-275, 2009.

26. Chen, T.C., Nosaka, K., Chen, H-L., Lin, M-R., and Wu, C-J. Changes in running economy at different intensities following downhill running. Journal of Sports Science, 27: 1-8, 2009.

27. Chen, T.C., Chen, H-L., Lin, M-J., Wu, C-J., and Nosaka, K. Potent protective effect conferred by four bouts of low intensity eccentric exercise. Medicine and Science in Sports and Exercise, 42(5): 1004-1012, 2010.

28. Cormie, P., McBride, J.M and McCaulley, G.O. Power-time, force-time and velocity-time curve analysis during vertical jumping: Impact of training. Journal of Strength and Conditioning Research, 23(1): 177-186, 2009.

29. Dankaerts, W., O'Sullivan, P.B., Burnett, A.F., Straker, L.M., Davey, P. and Gupta, R. Discriminating healthy controls and two clinical sub-groups of chronic low back pain patients using trunk muscle activation and lumbo-sacral kinematics of postures and movements: A statistical classification model. Spine, 34: 1610-1618, 2009.

30. Fujikake, T., Hart, R., and Nosaka, K. Changes in B-mode ultrasound echo intensity following injection of bupivacaine hydrochloride injection rat hind limb muscles in relation to histological changes. Ultrasound in Medicine and Biology, 35: 687-696, 2009.

31. Galvão, D.A., Taaffe, D.R., Spry, N., Joseph, D., and Newton, R.U. Cardiovascular and metabolic complications during androgen deprivation: Exercise as a potential

countermeasure. Prostate Cancer and Prostatic Diseases, Electronic publication 1365-7852/09. 2009.

32. Galvão, D.A., Taaffe, D.R., Spry, N., Joseph, D., Turner, D. and Newton, R.U. Reduced muscle strength and functional performance in men with prostate cancer undergoing androgen suppression: a comprehensive cross-sectional investigation. Prostate Cancer and Prostatic Diseases, 12: 198–203, 2009.

33. Hayes, S.C., Spence, R.R., Galvão, D.A. and Newton, R.U. Australian Association for Exercise and Sport Science position stand: Optimising cancer outcomes through exercise. Journal of Science and Medicine in Sport, 12(4): 428-434, 2009.

34. Hori, N., Newton, R. U., Kawamori, N., McGuigan, M., R., Kraemer, W. J, and Nosaka, K. Reliability of performance measurements derived from ground reaction force data during countermovement jump and the influence of sampling frequency. Journal of Strength and Conditioning Research, 23: 874-882, 2009.

35. Kay, R, Barton, C., Velloso, C., Brown, P., Bartlett, C., Blazevich, A., Godfrey, R., Goldspink, G., Rees, R., Ball, G., Cowan, D., Harridge, S., Roberts, J., Teale, P and Creaser, C. A high-throughput uHPLC-MS/MS quantitation of insulin-like-growth factor-1 and Leucine-rich a-2-glycoproein in serum as biomarkers of recombinant human growth hormone administration. Rapid Communications in Mass Spectrometry, 23: 3173-3182, 2009.

36. Kay, A.D. and Blazevich, A.J. Isometric contractions reduce plantar flexor moment, Achilles tendon stiffness and neuromuscular activity but remove the subsequent effects of stretch. Journal of Applied Physiology, 107:1181-1189, 2009.

37. Kay, A.D. and Blazevich, A.J. Moderate-duration static stretch reduces active and passive plantarflexor moment but not Achilles tendon stiffness or active muscle length. Journal of Applied Physiology, 106: 1249-1256, 2009.

38. Korff, T., Horne, S.L., Cullen, S.J. and Blazevich, A.J. Development of lower limb stiffness and its contribution to maximum vertical jumping power during adolescence. The Journal of Experimental Biology, 212: 3737-3742, 2009.

39. Laursen, P., Watson, G., Abbiss, C.R., Wall, B.A., and Nosaka, K. Hyperthermic fatigue precedes a rapid reduction in serum sodium in an Ironman triathlete : a case report. International Journal of Sports Physiology and Performance, 4: 533-537, 2009.

40. McBride, J.M., McCaully, G.O., Cormie, P., Nuzzo, J.L., Cavil, M.J. and Triplett, N.T. Comparison of methods to quantify volume during resistance exercise. Journal of Strength and Conditioning Research, 23(1): 106-110, 2009.

41. McCaulley, G.O., McBride, J.M., Cormie, P., Hudson, M.B., Nuzzo, J.L., Quindry, J.C. and Triplett, T.N. Acute hormonal and neuromuscular responses to hypertrophy, strength and power type resistance exercise. European Journal Applied Physiology, 105(5): 695-704, 2009.

42. McGuigan, M.R., Cormack, S. and Newton, R.U. Long term power performance of elite Australian Rules football players. Journal of Strength and Conditioning Research, 23(1): 26-32, 2009.

43. McGuigan, M.R., Tatasciore, M., Newton, R.U., and Pettigrew, S. Eight weeks of resistance training can significantly alter body composition in children who are overweight and obese. Journal of Strength and Conditioning Research, 23(1): 80-85, 2009.

44. Medic, N., Starkes, J. L., Weir, P. L., Young, B. W., and Grove, J. R. Gender, age, and sport differences in the relative age effects among USA Masters swimming and track and field athletes. Journal of Sports Sciences, 27(14): 1535-1544, 2009.

45. Medic, N., Starkes, J. L., Weir, P. L., Young, B. W., and Grove, J. R. Relative age effect in Masters sports: Replication and extension. Research Quarterly for Exercise and Sport, 80, 669-675, 2009.

46. Meylan, C.M., Nosaka, K., Green, J.P., and Cronin, J.B. Variability and influence of eccentric kinematics on unilateral vertical, horizontal, and lateral countermovement jump performance. Journal of Strength and Conditioning Research, 24(3): 840-845, 2010.

47. Mitchell, T., O'Sullivan, P.B., Smith, A., Burnett, A.F., Straker, L. Thornton, J. and Rudd, C.J. Biopsychosocial factors are associated with low back pain in female nursing students: A cross sectional study. International Journal of Nursing Studies, 46: 678-688, 2009.

48. Muthalib, M., Jubeau, M., Millet, G.Y., Maffiuletti, N.A., and Nosaka, K. Comparison between electrically evoked and voluntary isometric contractions forbiceps brachii muscle oxidative metabolism using near-infrared spectroscopy. European Journal of Applied Physiology, 107: 235-241, 2009.

49. Newton, R.U., Taaffe, D.R., Spry, N., Gardiner, R.A., Levin, G., Wall, B., D. Joseph D., Chambers, S.K., and Galvão. D.A. A Phase III clinical trial of exercise modalities on treatment side-effects in men receiving therapy for prostate cancer. BMC Cancer, 9: 210, 2009.

50. Ng, L., Burnett, A., Campbell, A. and O'Sullivan, P. Caution: The use of an electromagnetic device to measure trunk kinematics on rowing ergometers Sports Biomechanics, 8: 255-259, 2009.

51. Nimphius, S. From the field: A pre-season program for improving performance in elite softball players. Journal of Australian Strength and Conditioning, In Press, 2009.

52. Peiffer, J.J., Abbiss, C.R., Nosaka, K., Watson, G., and Laursen, P.B. Effect of cold water immersion on repeated 1 km cycling performance in the heat. Journal of Science and Medicine in Sport, 13: 112-116, 2010.

53. Peiffer, J.J., Abbiss, C.R., Chapman, D., Laursen, P.B., and Parker, D.L. Physiological characteristics of masters cyclists. Journal of Strength and Conditioning Research, 22(5): 1434-1440, 2009.

54. Peiffer, J.J., Abbiss, C.R., Nosaka, K., and Laursen, P.B. Effect of cold-water immersion duration on body temperature and muscle function. Journal of Sport Sciences, 27(10): 987-993, 2009.

55. Peiffer, J.J., Abbiss, C.R., Nosaka, K., Peake, J.M., and Laursen, P.B. Effect of cold water immersion after exercise in the heat on muscle function, body temperatures, and vessel diameter. Journal of Science and Medicine in Sports, 12: 91-96, 2009.

56. Piggot, B., Newton, M., and McGuigan, M. The relationship between training load and incidence of injury and illness over a pre-season at an Australian Football League Club. Journal of Australian Strength and Conditioning, 17(3): 4-17, 2009.

57. Ranson, C., King, M., Burnett, A., Worthington, P., Shine, K. The effect of coaching intervention on elite fast bowling technique over a two year period. Sports Biomechanics, 8: 261-274, 2009.

58. Sgro, M., McGuigan, M.R., Pettigrew, S., and Newton, R.U. The effect of duration of resistance training interventions in children who are overweight or obese. Journal of Strength and Conditioning Research, 23(4): 1263-1270, 2009.

59. Sheppard, J.M., Chapman, D.W., Gough, C., McGuigan M.R., and Newton, R.U. Twelve-month training-induced changes in elite international volleyball players. Journal of Strength and Conditioning Research, 23(7): 2096–2101, 2009.

60. Siegel, R., Maté, J., Brearley, M.B., Watson, G., Nosaka, K., and Laursen, P. Ice slurry ingestion increases core temperature capacity and running time in the heat. Medicine and Science in Sports and Exercise, 42(4): 717-725, 2010.

61. Sinclair, J., Hingston, P., Masek, M., and Nosaka, K. Using a virtual body to aid in exergaming system development. IEEE Compute Graphics and Applications, March/April 29(2): 39-48, 2009.

62. Slater, H., Thériault, E., Ronningen, B.O., Clark, R., and Nosaka, K. Exercise-induced mechanical hyperalgesia in musculotendinous tissue of the lateral elbow. Manual Therapy, 15(1): 66-73, 2010.

63. Spry, N.A., Galvão, D.A., Davies, R., La Bianca, S., Joseph, D., Davidson, A., and Prince, R. Long-term effects of intermittent androgen suppression on testosterone recovery and bone mineral density: results of a 33-month observational study. *British Journal of Urology International*, 4(6):806-812, 2009.

64. Straker, L., Skoss, R., Burnett, A. and Burgess-Limerick, R. (2009). Effect of visual display height on modelled upper and lower cervical gravitational moment, muscle capacity and relative strain. Ergonomics, 52: 204-221, 2009.

65. Uchida, M.C., Nosaka, K., Ugrinowitsch, C., Yamashita, A.S., Martins, E.J., Moriscot, A.S., and Aoki, M.S. Effect of bench press exercise intensity on muscle soreness and inflammatory mediators. Journal of Sport Science, 27: 499-507, 2009.

66. Young, B. W., Medic, N., and Starkes, J. L. The effects of daily take-home training logs on behavioural correlates of self-regulation in swimmers. Journal of Applied Sport Psychology, 21(4): 413-428, 2009.

CONFERENCE PRESENTATIONS

1. Abbiss, C.R., Ross, M.L.R., Garvican, L., Higman, D.G., Ross, N. and Martin, D.T. Pacing with reference to terrain during the 2009 MTB World Championships. Proceedings of the Applied Physiology Conference. Canberra, ACT, 2009.

2. Alcaraz, P.E., Pérez-Gómez, G., Chavarrias, M. & Blazevich A.J. Effects of 8 weeks of heavy resistance circuit training vs. traditional strength training on physical performance and body composition. 14th Annual Congress of the European College of Sports Sciences. Oslo, Norway, 24-27 July 2009.

3. Blazevich, A.J. (2009). Adaptations to strength training: What do we really know? Invited speaker at the Centre for Sports Science and Human Performance, Brunel University. London, UK, 8 July 2009.

4. Blazevich, A.J., Cannavan, D., Miller, S., Waugh, C., Fath, F., Kay, T., Thorlund, J.B., Aagaard, P. Influence of plantarflexor stretch training on fascicle length and strain, H-reflex amplitude and muscle force production. 14th Annual Congress of the European College of Sports Sciences. Oslo, Norway, 24-27 July 2009.

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18. Levin, G.T., Newton, R.U., Taaffe, D.R., Spry, N., Wall, B., Joseph, D. and Galvão, D.A. Aerobic capacity is associated with functional performance and quality of life in men receiving androgen deprivation therapy for prostate cancer. Cancer Council Western Australia Cancer Research Symposium 'Advancing Cancer Research in WA'. Fremantle, 3 December 2009.

19. Martin, D.T.M., Gregory, J., Highman, D., Ross, M.L.R., Abbiss, C.R. and Ross, N. Cycling power during MTB hill climbing and laboratory testing: Implications for training. Proceeding of the 57th Annual Congress of the American College of Sports Medicine. Baltimore, USA, 2009.

20. Mizuguchi, S., Cormie, P. Layne, A., South, M., Haff, G.G., Sands, W.A., McBride, J. M., Ramsey, M.W. and Stone, M.H. Comparison of concentric impulse determination methods in the countermovement jump. Coaches and Sport Science College, Center for Excellence in Sports Science and Coach Education. Johnson City, USA, December 2009.

21. Muthalib, M., Jubeau, M., Millet, G.Y., Maffiuletti, N.A., and Nosaka, K. Comparison between voluntary and electrically evoked isometric contractions for muscle oxygenation and blood volume of the biceps brachii muscle. 14th Annual Congress of the ECSS. Oslo, Norway, 24-27 June 2009.

22. Newton, R.U. Exercise prescription in chronic disease management. Australian Disease Management Association - 5th Annual National Disease Management Conference. Melbourne, VIC, 3-4 September 2009.

23. Newton, R.U. Exercise and older people: the need to pump iron. Australian Association of Gerontology, SA Gerontology Conference. Adelaide, SA, 28 August 2009.

24. Newton, R.U. Exercise as medicine for chronic disease management. Alice Springs GP Network. Alice Springs, NT, 27 March 2009.

25. Newton, R.U. Ageing Well – How to do it. HACO Conference, Gold Coast, Qld, 15th March 2009.

26. Newton, R.U. Exercise as medicine for cancer. Leukaemia Foundation – Multiple Myeloma Seminar. St John of God Hospital, Subiaco, WA, 19 February 2009.

27. Newton, R.U. Performance diagnosis informs athlete management. ASCA National Conference Proceedings, 21-23 November 2008. Pages 13-21, 2009.

28. Newton, R.U. The effectiveness of exercise in Parkinson's disease, diabetes and cancer. 2009 Nutrition Society of Australia Annual Scientific Meeting on: Sarcopenia in Older Age, Chronic Disease and Obesity: Implications for Healthcare. Newcastle, NSW, 7 December 2009.

29. Nosaka, K., Chen, T.C., Chen, H.L., Lin, M.R., and Wu, C.J. Responses to four eccentric exercise bouts of the elbow flexors performed every four weeks. 14th Annual Congress of the ECSS. Oslo, Norway, 24-27 June 2009.
30. Pegoraro, R., Jubeau, M., Watson, G., Laursen, P., and Nosaka, K. Electrical train stimulation as an assessment of muscle cramp. 14th Annual Congress of the ECSS. Oslo, Norway, 24-27 June 2009.

31. Peiffer, J.J. and Abbiss, C.R. The heat of competition: Influence of environmental temperature on 40 km time trial performance. The Future of Fatigue in Exercise: An

International Symposium on the Limits to Exercise Performance. Blue Mountains, Australia, 2009.

32. Pettigrew, S., Donovan, R., Newton, R.U. and Boldy, D. Conceptions of wellbeing, physical health, and mental health. IX ISQOLS Conference, Florence, Italy, 19-23 July 2009.

33. Ross, M.L.R., Garvican, L.A., Laursen, P.B., Abbiss, C.R., Martin, D.T.M. and Burke, L.M. Novel pre-cooling strategy enhances time trial cycling in the heat. Proceedings of the Applied Physiology Conference. Canberra, ACT, 2009.

34. Taaffe, D.R., Galvão, D.A., Spry, N., Joseph, D. and Newton, R.U. Increased prevalence of sarcopenia in men taking androgen suppression treatment for prostate cancer. Australian Conference of Science and Medicine in Sport "Be Active 09". Brisbane, QLD, 14-17 October 2009.

35. Young, B. W., Starkes, J. L., & Medic, N. Lifespan analyses of social influences on the sport commitment and participation of masers athletes: Year 2 progress report. Sport Canada Research Initiative Conference. November 2009.

36. Young, B. W., Medic, N., Cameron, S., Theberge, I., & Latham, C. Exploring perceived barriers to sport involvement amongst Ontario senior games participants. Canadian Society for Psychomotor Learning and Sport Psychology Abstracts. November 2009.

HIGHER DEGREES BY RESEARCH COMPLETIONS

In 2009, 3 PhD and 5 Masters by Research students completed the degrees.

1. Matt Brughelli (PhD): Risk factors, assessment and prevention of muscle strain injuries (John Cronin, Ken Nosaka)

2. Prue Cormie (PhD): The influence of strength level on the force-velocity relationship and the ability to adapt to power training (Rob Newton, Mike McGuigan)

3. Jeremy Sheppard (PhD): The competitive, physiological and trainable aspects of vertical jump performance: A focus on volleyball athletes (Rob Newton, Mike McGuigan)

4. Benjamin Hinton (MSc): The acute effects of whole-body vibration and heavy resistance exercise on countermovement jump (Mike Newton, Mike McGuigan)

5. Wee Pheng Hong (MSc): Physiological characteristics and time-motion analysis of young soccer players (Mike Newton, Mike McGuigan)

6. Cesar Meylan (MSc): Kinematic and kinetic characteristics of unilateral jump assessments: reliability, asymmetry, and relationship to jump performance (John Cronin, Ken Nosaka)

7. Travis McMaster (MSc): The effect of resistance mode on squat and jump kinematics and kinetics (John Cronin, Mike McGuigan)

8. Wei Peng Teo (MSc): The effects of circadian rhythmicity of salivary cortisol and testosterone on maximal isometric force, maximal dynamic force production and power output (Mike Newton, Mike McGuigan)

VISITORS (Visiting Research Fellows)

- Dr. Stephen S. Cheung: July 2009. Brock University, Canada
- Dr. Jim Martin: August 2009. University of Utah, USA
- Dr. Valmor Tricolli: September 2009 – February 2010. University of Sao Paulo, Brazil

COMMUNITY ENGAGEMENT ACTIVITIES AND LINKAGES

The members of the CESSR engage in the community in many different ways from reviewing manuscripts, examining grant applications, organising meetings and playing a role in a meeting, working with other organisations and industries, and working for the School, Faculty, and University community.

Some of the professional organisations and industries that the member worked with in 2009 include;

- Australian Institute of Sport
- Centre for Neuromuscular and Neurological Disorders (UWA)
- Cycling Australia
- English Cricket Board
- Recreation Network Western Australia: Department of Sports and Recreation
- Singapore Sport School
- Singapore Sport Council
- United States Olympic Training Centre (USA)
- United States Ski and Snowboard Association (USA)
- West Australian Institute of Sport
- West Coast Eagles Football Club
- Perth Glory Football Club

FUTURE PLANS AND DIRECTION

The CESSR has been performing well in the last three years in terms of the number of publications, the amount of grant funding, and higher degree research student completions. However, considering the number of members, the research outcomes are not necessary large per member. Especially, the majority of the external funding was made by a couple of members of the Centre, and we should admit that we have not achieved the mission to obtain "Category I grants." We have allocated some support to the members who write a "Category I grant" applications and who want to conduct a pilot study toward a "Category I grant" study. Although getting "Category I grants" is important, it should be noted that not all exercise and sports science studies are suitable for such grants, and some studies do not require a large amount of funding to be conducted. In fact, we have many publications from postgraduate students' projects in which only a part of student research allowance was used. This means that some exercise and sports science research can be done with good ideas and hard work without a large amount of money. We support our research students and their supervisors to accomplish as their highest outcomes as possible.

We have a large number of postgraduate students in the Centre. However, considering the number of our full-time academic staff members (n=15), the number of students per staff member (n=45/15, 3) is not necessary large, and importantly, some of the staff members do not have any postgraduate students, since they focus on the undergraduate teaching more. It is important to note that they still contribute to research, and because of their dedication to teaching, we can get good research students, and a time and funding to do research. So, our achievement is the product of a good teamwork. Since postgraduate students are the driving force of our research, it is necessary to have good quality students each year.

We have been having 3-4 visiting research fellows per year, which is very beneficial for us. It should be noted that we continue working with the former visiting research fellows. We are reinforcing the existing networks, and seek new networks and try to have more visitors. We have been making the best use of the visiting research fellow scheme, but need to consider other ways to have visiting research fellows, if it is not possible to get enough funding for us to have many visiting research fellows. The Centre needs to extend collaborations with institutions and researchers all over the world.

In terms of community engagement, it is necessary to consider how the CESSR (not individual member level but as the Centre) could engage in the community. We have the Human Performance Centre that serves athletes and coaches to enhance their performance. It

may be good to have a closer link between the CESSR and the Human Performance Centre. We need to discuss this further in 2010 with a new director of the Human Performance Centre (Zane McDonald) has been in the position

It is a challenge for the CESSR to continue to perform well for 2010, but we will strive to improve the outcomes in all of the aspects shown in this report in 2010.

DATE OF NEXT FORMAL REVIEW

We are supposed to have a 5-year review in 2010, but it appears too early for us to have the 5-year review this year, since the CESSR was established in 2007, and this report is based on our third year performance. If the 5-year review should be performed in the fifth year after establishment of a Centre, we expect to have it in 2011.