Introduction by John Ledlie, Director of the Peter Harrison Foundation

In the summer of 2003, following discussions with Prof. Stuart Biddle and with the active support of Sir David Wallace, Vice – Chancellor at the time, the Peter Harrison Foundation decided to proceed with long term funding for the creation of a Centre for Disability Sport at Loughborough University. We had in mind the establishment of a top quality research centre, which would build up a core of evidence – based research to take forward the study of Disability Sport – a field to which the Foundation has devoted a significant proportion of our grants over the past 10 years; under our “Opportunity through Sport” programme we have made grants totaling almost £9 million over this period.

Six years on from the creation of the Peter Harrison Centre for Disability Sport, we are delighted with the way the work is progressing. Under the current Director, Dr. Vicky Tolfrey, a great deal has been achieved, both in research projects themselves and in extending awareness of Paralympic sports, both in the UK and abroad. The Foundation was also anxious to increase general understanding of the enormous benefits that involvement in disability sport, of whatever kind, can provide to participants – and we are pleased with how awareness of these benefits is being extended. A range of world wide contacts is also being established; the Centre is now becoming known as an international centre of excellence.

We are accordingly delighted to announce that the Trustees of the Foundation have this year decided to extend their core funding of the Centre for a further 2 years – i.e. until 2013. This will provide the Centre with the opportunity to continue – and indeed expand – its work up to, and including, the holding of the next Paralympics here in the UK in 2012.

The Peter Harrison Centre for Disability Sport is the flagship programme of the Foundation. We are proud of its progress to date – and we wish the Centre and all who work there every success in the years to come.

Further information about the Peter Harrison Foundation can be found at: http://www.peterharrisonfoundation.org/index.htm
Welcome Message from the Director Dr Vicky Tolfrey

I warmly welcome Dr. Brett Smith, Carla Silva, Paul Sindall to the Peter Harrison Centre of Disability Sport (PHC). I am delighted that the Peter Harrison Foundation have extended their funding until 2013, and for their generous support over the last few years. As a result of this commitment, we can now fully engage in projects leading into the 2012 London Paralympic Games with the retention of key staff. We are excited with this investment and this year we aim to build on the experience gained in the past and, at the same time, develop new and exciting collaborations with others in the field of disability sport.

This issue of the PHC newsletter focuses on the activities over the recent months that include conferences and overseas travel, a series of research updates, two interviews of key external partners associated with the PHC and a special invited article translating the research area of ‘Respiratory muscle training for wheelchair racing athletes’ by Dr Claudio Perret from the Swiss Paraplegic Centre in Switzerland. I wish Nik Diaper and his colleagues from the UK Sport 2012 Talent Team all the best with their search for the next Paralympic champion! Just before Christmas they launched some fantastic promotional material which can be seen on the next page.

I hope you enjoy reading this issue and I wish you all the best in 2010, which is the year that will see the launch of ‘Wheelchair Sport’ a new book in the field of disability sport published by Human Kinetics.

Vicky Tolfrey
Director of the Peter Harrison Centre for Disability Sport  v.l.tolfrey@lboro.ac.uk

Latest Publications and Invited Presentations from PHC Staff/Students

Research Articles

Presentations
Dr Brett Smith, PhD, feels very privileged to be part of The Peter Harrison Centre for Disability Sport. He is a qualitative researcher and founding Co-Editor of the journal *Qualitative Research in Sport & Exercise.* His theoretical and empirical research interests broadly concern the psycho-social dimensions of disability, embodiment, and health; the development of qualitative research methods and methodologies; and narrative inquiry.

He is currently working on two projects. The first focuses on developing an ethnographic creative non-fiction to widely disseminate findings from a study that explored men’s experiences of suffering a spinal cord injury through playing sport. The second project, funded by the UK Spinal Cord Injury Research Network (UKSCIRN), focuses on understanding the well-being of spinal cord injured patients who are isolated for over a year as a result of pressure ulcers.

In addition to these current interests, Brett is developing work on disability, quality of life, resilience, and post-traumatic growth. Brett has published extensively on sport, disability, and research methods across a range of disciplines in international peer reviewed journals. He is an honorary research associate of the Centre for Interdisciplinary Research on Narrative (CIRN) at St. Thomas University, Canada. He collaborates too with sociologists, psychologists, and chaplains at the Toronto Rehabilitation Centre, Canada. Brett is honoured to teach courses on Research Methods to undergraduate and post-graduate students. He is also pleased to serve on numerous editorial boards and act as an associate editor for the journal *Psychology of Sport and Exercise.* Dr Brett can be contacted at: B.M.Smith@lboro.ac.uk or see his staff profile on the PHC website.

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**Staff Profile of Dr Brett Smith**

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**Student Profile of Carla Silva**

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**TALENT 2012**

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**GOT GOLD IN YOU?**

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Do you have:
An impairment?
A UK passport?
A sporting background?
The desire to find out if you’ve got what it takes to win Paralympic gold in London?

If you are aged between 15 and 35, then we want to hear from you. Register online at: www.uksport.gov.uk/talent
Members of the PHC Sport Science research strand have been working with the Great Britain Wheelchair Basketball Association (GBWBA) to help them fulfill their performance sports science and medicine strategy towards the Paralympic cycle. The PHC are working with both the GB Men’s and Women’s squads.

The PHC is pleased to report that in August, the GB Women’s Team came through a tough encounter with the French to finish winning the Bronze medal in the 2009 FSB Women’s European Wheelchair Basketball Championships.

Leading scorers for the GB Women’s Team were Caroline Maclean with 16 points and Caroline Matthews with 11 points. The team are looking forward to continue developing as a squad and moving forward for both the World Championships in 2010 in Birmingham and onto London 2012.

The PHC is also proud to announce that on Thursday 15th October 2009, the GB Men’s team won a well deserved bronze medal at the European Championships by defeating a gritty Poland 73 - 65 in Adana, Turkey. The game was of a high standard with both teams shooting the ball at an impressive rate. Team GB shot the ball at 51% and Poland at 62%.

The GB Team’s leading scorers were Jon Pollock 34 points and 5 assists, Simon Munn 16 points and 6 rebounds, Terry Bywater 8 points and 5 rebounds and Ian Sagar 7 points and 9 rebounds.

The GB Team’s Head Coach Murray Treseder said that he was ‘pleased with his team’s performance during the championships’ and ‘disappointed that they were not in the final but are making pleasing progress as his team heads towards the 2010 World Championships’.

Richard Whitehead Sets New World Record at the Chicago Marathon

Double amputee marathon runner, Richard Whitehead uses the specialised treadmill at the PHC testing lab to help his training. Here he comments on his latest success at the Chicago Marathon that was held on Sunday 11th October 2009.

‘I had been training hard since Boston, so I was ecstatic when I broke the record again’.

‘The conditions were really cold! 4 - 5 degrees in fact but the weather is a by-product of the race, you race to the conditions and I was running well. I was running a 6.27 minute mile and it was going well up to 24 miles. It then got much tougher. I knew I was on for breaking the 3 hour mark again but I had to keep going. Before the race I was confident I had done all I could with the help of Liz (my coach) so I just had to keep going’.

‘I have got a good team around me so I felt prepared. I had been to a training camp in Portugal and had fitness tests at Loughborough University so I knew I was ready, I just needed to run the race’.

‘My future plans - Gearing up for the 2011 World Championships. The B standard - I have broken the 3 hour mark twice now, but the A standard in 2 hours 35 minutes. I going to concentrate at trying to work up to that. I will increase my frequency of training, perhaps work on nutrition and look at other areas also’.
Interview: Paul Davies, Associated Partner of the PHC

Interviewed by Charlotte Greasley, PHC Information Officer

Paul Davies is a key associated partner of the PHC. In May The English Institute of Sport (EIS) appointed Paul as the Head of Sport Science & Medicine for World Class funded sports competing in the next Paralympics. He will work with key partners such as ParalympicsGB, the Home Country Sports Institutes and UK Sport to ensure that best practice is recognised and knowledge is shared. Previously Paul worked as the Head of Sport Science and Medicine at ParalympicsGB.

Q: Congratulations on your new job role. For the benefit of those who are unfamiliar with your work could you please provide a brief overview of your experience?

‘Thank you. I originally undertook the traditional pathway of a Sports Science degree, followed by post graduate research work in the areas of Physiology and Nutrition. During this time I was asked to provide some advice and guidance on acclimatisation for the Shooting team, who were in their final preparation for the 1996 Paralympic Games in Atlanta. This was my first introduction to Paralympic sport, and it both challenged and intrigued me; as with many people, I had a vague understanding of what the Paralympics was but hadn’t really understood its full magnitude. Some six years later, after three years working as an Exercise Physiologist with the British Olympic Association and three years University lecturing in Applied Physiology and Nutrition I took up the newly created Performance Manager role within the British Paralympic Association. Whilst with the BPA I oversaw the delivery of the sports science and medicine strategy, including services to the Great Britain Paralympic teams for Athens, Vancouver and Beijing. I look forward to bringing these experiences into the new role within the EIS’

Q: So can you tell us what your new role will involve?

‘My new role will involve providing guidance and support to those practitioners working within the Paralympic environment, alongside supporting EIS in developing strategies to better support Paralympic sports and their athletes in training and competition. To date this has involved working with the sports and the Lead Contacts for each sport within the EIS in ensuring that services provided are targeted and prioritised and have clear aims and objectives - time between now and London is short and we need to be sure that we are focussing our efforts in exactly the right areas to get the most from the time and resources that we have available’.

‘I am also keen to harness the knowledge of Paralympic sport that we have in the UK - we are world leaders and our athletes have an unprecedented level of support and expertise available to them. We need to harness this experience to ensure that it can move the whole Paralympic movement within the UK forward; the opposition are making progress and we need to ensure that we remain a leading Paralympic nation. Related to this I have recently started an exciting project that looks to bring the Paralympic community closer together to discuss ideas and contemporary thinking in areas of sports science and sports medicine. EIS are looking to host some of the tools and technology that many of us use in our day to day work life; forums, blogs and wiki pages, to build a long term knowledge base that will guide our practice in the future. Putting all these things in one place, and with the support that the EIS can provide to this process will allow us to build a knowledge base’.

Q: Do you feel that the PHC can help you in your new role? Are there any initiatives that we should be looking at in order to help you?

‘Science support to athletes should be based upon a solid foundation, and I will continue to enjoy the interaction we have with the PHC, who are one of the key partners in providing answers to Paralympic questions. Knowing that we have good scientists working away on the key questions allows the EIS to focus upon the delivery of service and gives us confidence in the validity of our methods’.

‘Collaborative projects such as those of body composition assessment in Paralympic athletes demonstrate perfectly how support questions are being answered by the work of the PHC’.

Q: In the future what do you think the PHC should be focussing on to help you with further collaborative work?

‘We have talked for a few years about developing a formal ‘research agenda’ for Paralympic sport, to ensure that we are all focussed upon addressing the issues that matter the most to our sports and our athletes. I think that the PHC could play a key role in bringing together the main parties that are needed for this discussion: the sports, the academic community and the deliverers of service such as EIS and the other Home Country Sports Institutes’.

The PHC would like to thank Paul for agreeing to be interviewed about his new role.
Research Links with Stellenbosch University
Strengthened with Recent Visit

Dr Vicky Tolfrey traveled to South Africa as part of an on-going initiative to explore the potential collaborative opportunities in ‘Disability Sport’ with Prof Liz Bressan (Director of the Centre for Human Performance Sciences) and her team. This was Vicky’s second visit to the Stellenbosch University but on this occasion she was accompanied by Dr Keith Tolfrey and Jeanette Crosland (as can be seen on the left). Formal presentations were delivered in the areas of paediatric exercise physiology, disability sport and nutrition + sports performance to the M.Phil students in Exercise Science, Department of Physiological Sciences. Following the presentations Vicky and Keith met with Prof Kathy Myburgh (Head of the Department of Physiological Sciences) together with Dr Carine Smith to discuss both current and future research opportunities.

Research visit opens our portfolio with opportunities for an international exchange / point of contact for post-graduate students.

Professor Martin Ferguson-Pell organised an itinerary that ensured Vicky maximised her learning opportunities during a recent visit to the University of Alberta in Canada. Vicky met with a variety of individuals which included academics from the University, hospital staff from the Glenrose Rehabilitation Hospital and Louise Miller who is the president of the Spinal Cord Injury Treatment Centre.

Vicky was able to gain an insight into the rehabilitation practices in Canada and at the same time formulate research ideas with Prof Ferguson-Pell in the area of ‘wheelchair propulsion and technology enhancements’. Key areas of opportunity include developing state-of-the-art diagnostic services with the use of the SmartWheel and to extend its application to understand differing levels of wheelchair propulsion experience and the impact of being able to use the ratings of perceived exertion for exercise prescription. There appeared to be a lot to offer, yet a key outcome of the visit involved a visit to the Steadward Centre where Vicky was able to gain an understanding about its operational structure under the directorship of Dr Donna Goodwin.

Commenting on the visit Dr Vicky Tolfrey said:

‘I was able to learn a lot from the discussions I had with key colleagues and working partners of Prof Martin Ferguson-Pell. The key will be how we can use this visit as a platform for international exchange for members of my PHC team to work together in research projects. Already, following my visit John Lenton and Christof Leicht are working on a proposal to conduct a study in the area of manual wheelchair propulsion later in the year, whilst establishing an exchange of communications with two post-graduate students from the University to make contact with.’

Prof Martin Ferguson-Pell said:

‘We received many complimentary comments about Dr Vicky Tolfrey’s invited lecture ‘Applied research to support the Paralympic wheelchair athlete preparing for Beijing’, which certainly met all our expectations with the launch of the Distinguished Speaker Series.’

As a result of this visit, PHC Research Assistant, John Lenton, has been invited to connect with Maggie Wu (Jaijie) Rehabilitation Science Student from the Faculty of Rehabilitation Medicine at the University of Alberta.
What does the Paralympic movement mean to YOU?

By David Purdue, Associated PhD Student in the Sociology of Sport

Answer: Well, that depends…

The next Paralympic Games are almost here. No, not the Paralympic Games being held in London in 2012, but the Winter Paralympic Games in Vancouver, to be held between 12th-21st March 2010. Some may argue that the Summer and Winter Paralympic Games are poles apart in a variety of ways. The Summer Paralympic Games consist of a greater number of athletes and different sports compared to its counterpart the Winter Paralympic Games. However, both the Summer and Winter Paralympic Games are managed and marketed by the International Paralympic Committee (IPC) as ‘Paralympic sport’.

Our perception of which Paralympic Games, and furthermore which Paralympic sports really matter, is informed by our social and cultural experiences, surroundings and subsequent opinions. For example, an interest in the Summer Paralympic Games, and relative ignorance of the Winter Paralympic Games, could stem from an individual living in a country where they rarely experience snow and do not regularly spectate and/or partake in the sports that make up the Winter Paralympic Games.

The diversity of the Paralympic movement is a significant, yet often overlooked, factor in Paralympic sport. The Paralympic movement includes a variety of different sports for a select range of impaired athletes with varying degrees of impairment. However, the broad spectrum of sporting competition, as it exists within the Paralympic movement, demands closer attention and a more detailed analysis. To oversimplify Paralympic sport results in a misleading and ultimately inaccurate representation of the Paralympic movement.

To begin to unpack and critically analyse the social perceptions and subsequent demands placed upon the Paralympic movement, in my research I seek to explore how and why Paralympic sport, as experienced through the Summer Paralympic Games, is perceived by a variety of different people.

The significant issues that have affected, and continue to influence, the development of the Paralympic movement are of key interest to my research. These issues are being explored through semi-structured interviews that have to-date been held with a range of individuals who have had some experience of, or interaction with, Paralympic sport. Some of the issues explored with interviewees so far include: classification in Paralympic sport, the purpose(s) of the Summer Paralympic Games, the influence of disability rights on Paralympic sport, the interactions of different disability groups within the Paralympic movement and discussion as to which sports should be included in the Summer Paralympic Games.

Throughout the interview process I have sought to access a variety of Paralympic stakeholders. Too often there is perhaps a pre-occupation with merely accepting the dominant, mainstream portrayals of Paralympic sport.

The Paralympic movement is a multifaceted and complex social creation. This research aims to give a voice to a wider populous of Paralympic stakeholders and allow their Paralympic experiences, opinions, hopes and fears to begin to be recognised and explored, in an endeavour to expand and develop an understanding of Paralympic sport, so that it serves those individuals whom it represents.

If you would like to share some of your Paralympic experiences, opinions, hopes and fears, and contribute to furthering our collective understanding of the Paralympic movement, please feel free to contact David by e-mail at D.E.J.Purdue@lboro.ac.uk.
Respiratory muscle training for wheelchair racing athletes

By Dr. Claudio Perret,
Institute of Sports Medicine, Swiss Paraplegic Centre, Nottwil, Switzerland

Dr Claudio Perret, works at the Institute of Sports Medicine at the Swiss Paraplegic Centre in Nottwil, Switzerland. His main research interests include exercise and respiratory physiology in spinal cord injured and able-bodied athletes.

Background

Respiratory muscle function in individuals with spinal cord injury can be severely impaired due to a lesion dependent paralysis of respiratory muscles (Fig. 1). Thus, the remaining innervated respiratory muscles have to manage the whole work of breathing during rest and even more during physical activity. As a consequence, respiratory muscles of wheelchair athletes have to work at a higher relative intensity compared to able-bodied athletes. Moreover, during upper body exercise (e.g. propulsion of a wheelchair, armcranking) some of the respiratory muscles of the rib cage have to partake in nonventilatory functions (Celli et al., 1988). Therefore, it is not surprising that there is some evidence for diaphragmatic fatigue induced by physical activity in tetraplegic participants (Sinderby et al., 1996) as well as increased respiratory muscle endurance after a physical endurance exercise program (Silva et al., 1998).

In this context, a well directed respiratory muscle training program might be beneficial to enhance exercise performance in wheelchair athletes with spinal cord injury, such as wheelchair racers. Although an improvement in physical exercise performance after different types of respiratory muscle training was found in able-bodied subjects (for review see McConnell and Romer, 2004), there is a lack of data in the field of wheelchair sports and no generally accepted guidelines (concerning intensity, frequency and duration of training sessions) exist on how to perform respiratory muscle training in this specific group of athletes. In fact, to date only one controlled study using wheelchair racing athletes exists (Mueller et al., 2008). This study examined the impact of respiratory muscle endurance training on 10k time trial performance and showed some promising results in enhancing physical endurance performance in the training group (11.1% decrease in 10k time trial performance vs. a non significant 0.8% decrease in the control group). Moreover, a significant increase (over 300%) of respiratory muscle endurance and maximal expiratory mouth pressure (+13.4%) was found in the training group.

The principle of respiratory muscle endurance training

In order to perform respiratory muscle endurance training the principle of normocapnic hyperpnea is applied. While performing isolated intense hyperventilation, the idea of normocapnic hyperpnea is to keep end tidal CO\(_2\) at resting conditions to avoid dizziness and a concomitant early termination of the respiratory endurance training. Normocapnic conditions are reached by either adding CO\(_2\) to the inspired air or by the partial rebreathing technique. Therefore, breathing frequency and tidal volume has to be kept constant (i.e. constant minute ventilation) while breathing in and out of a bag. Due to technical constraints it was not possible to perform such a training with a portable device at home. However, today a commercially available device consisting of a hand held unit with a bag for rebreathing and a base station is available (Fig. 2) and allows an adequate endurance training of all in- and expiratory muscles.
How to perform respiratory endurance training?

Before starting respiratory endurance training determination of an individual’s lung function is needed. Based on measurements of forced vital capacity (FVC) and maximal voluntary ventilation (MVV) the device can be set up adequately. Therefore, a bag with a volume corresponding to approximately 50% of FVC should be used and breathing frequency should be adjusted in a way that a target ventilation of about 40% of MVV for tetraplegic and 60% of MVV for paraplegic participants is reached (Mueller et al., 2006). In order to ensure normocapnic conditions it is also recommended to check end tidal CO₂-levels by connecting the training device to an ergospirometric device during a familiarisation trial and to adjust parameters of the respiratory training device if necessary. After this initial set up, respiratory endurance training can be performed independently at home.

A training session normally lasts between 20-30min and should be performed 4 to 5 times per week for at least 4 to 6 weeks. From the time when a training session at the predetermined target ventilation can be sustained, respiratory frequency should be increased individually step by step with ongoing training sessions to increase respiratory training load. Later on, the target volume (bag size) may also be increased.

Practical aspects

Normocapnic hyperpnea training is time consuming, monotonous and very demanding. The latter makes it important to match respiratory endurance training with the generally performed exercise training sessions. Thus, it seems not to be indicated to perform a respiratory endurance training session closely prior to intense physical exercise training, as fatigued respiratory muscles may negatively influence physical exercise performance (Martin et al., 1982). In order to allow a proper recovery time to the respiratory muscles before a competition, respiratory endurance training should be completed approximately one week before racing. It seems also reasonable to perform the respiratory endurance training session in a position (e.g. sitting in the wheelchair) close to the competition specific position. There is also some evidence that trained respiratory muscles seem to enhance lactate elimination (Spengler et al., 1999). However, normocapnic hyperpnea as a recovery strategy to enhance lactate elimination after exhaustive upper body exercise failed to show positive results in this respect (Perret et al., 2007).

Conclusion

Although data are rare, respiratory endurance training by means of normocapnic hyperpnea seems to be a promising approach to enhance wheelchair racing performance. However, further studies are needed to obtain a better understanding of how such training can be implemented best into daily training routine of wheelchair racing athletes. Moreover, different respiratory training methods (e.g. resistive loaded breathing techniques) have to be investigated in conjunction with wheelchair racing performance to further optimise exercise performance in the future.

References

Christof Leicht, PHC Research Assistant

Respiratory warm-up as a training strategy for wheelchair athletes

In our last newsletter, we were pleased to announce the research award from of a Higher Education Collaboration Grant from the Healthcare and Bioscience iNet. After an intense planning period, discussing the protocols with experts in the field from both Nottingham Trent University and the University of Wales we have completed a number of practise trials (“pilot testing”) and now the study is fully up and running.

Several wheelchair athletes from all over the country have attended the physiology laboratory at Loughborough University to perform our tests, which involve maximal testing on the arm crank ergometer after warming up the respiratory muscles. This study also incorporates the University’s rowing club as we are also keen to find out whether upper body trained able bodied athletes show similar responses after a respiratory warm-up to the wheelchair athletes. All the athletes that have been involved to date have expressed a keen interest in this study, as the results may have an impact on their training habits.

The key question that is being addressed by the research team is: Does a respiratory warm-up improve performance in upper body exercise?

We look forward to sharing the research findings to our readers soon.

If you would like to know more about this project or ways you can get involved as a participant, please contact Christof Leicht at: C.A.Leicht@lboro.ac.uk

Mary West, BSc Student in Sport & Exercise Science, Loughborough University

Mary is currently studying for her BSc degree and chose to study the area of manual wheelchair propulsion for her final year project. Mary is expected to graduate in 2010 and has been interviewed by the PHC Information Officer to find out more about her final year physiology dissertation.

Q: How did your studies in Sport & Exercise Science lead onto your final year project?

‘My final year project is entitled the Manual hand-rim wheelchair propulsion practice: the effects of music on push frequency and gross efficiency in novice able-bodied participants’.

‘My favourite aspect of sports science is the physiology component and how interventions effect the performance of individuals in sport. I was initially intrigued to discover how the tempo of music can affect performance. It was clearly evident from the scientific literature that there had been a substantial amount of research conducted on both the physiological and psychological effects of music on performance during running. However, as a student studying at Loughborough University within the School of Sport, Exercise and Human Sciences, I was aware of the Peter Harrison Centre for Disability Sport lead by Dr. Vicky Tolfrey. Consequently, after discussions with Vicky and John Lenton, I decided to take a novel approach to my idea and apply this to the area of wheelchair propulsion. Both Vicky and John’s research has covered both push frequency and propulsion practice, but, never introduced music. It was therefore decided, that we would investigate the effects of listening to two different music tempo tracks of music over a three week practice period to examine the adaptations on push frequency and gross efficiency’.

Q: Has the Peter Harrison Centre (PHC) been able to support and help you with your final year project?

‘The PHC has excellent facilities and up-to-date equipment, enabling me to collect the data necessary to address my research question. The PHC has also given me the opportunity to work with John who has taught me the appropriate skills for my data collection. Through his invaluable support, I have learnt new skills and I have been able to develop both my laboratory skills and develop a better understanding of wheelchair propulsion. Consequently, these combined factors (facilities/equipment and the support received) has been fundamental to the smooth running of the project to date’.

www.peterharrisoncentre.org.uk  Tel: 01509 226387
 Classification

John Lenton is leading the collection of range of movement data from wheelchair track athletes competing at the Summer Down Under series in Australia from the 23rd to 31st January. This invitation by Dr Sean Tweedy demonstrates the collaboration that we began in January last year, in which John has piloted the measures of range of movement, assessed their reliability and begun establishing normal values for the measures in people without disabilities (with Dr Thomas Janssen).

John and Dr Tolfrey representing the PHC at Loughborough University (Great Britain) will be joining others from the international team who are collaborating on the IPC Athletics Classification Project, including researchers from University of Queensland (Australia), Katholieke Universiteit Leuven (Belgium), Stellenbosch University (South Africa), Lakeshore Foundation (USA), University of Sunshine Coast (Australia) and Universidade Federal de Sao Paulo (Brazil).

What tests will be done? - Testing will comprise of some tests of acceleration and top speed on a wheelchair ergometer, tests of isometric strength, some coordination testing (reciprocal plate tapping and aiming tasks) and some range of movement tests.

How will the results be used? - The results will be pooled with the results from other athletes to help the IPC classification researchers better understand the relationship between impairment and athletic performance. In practical terms it will provide the team with a much more accurate and valid way of classifying athletes, especially those who do not have a complete spinal cord injury or amputation and therefore do not exactly fit the current classification system (for example athletes with incomplete spinal cord injuries, polio and peripheral neuropathies).

If you wish to contact Sean Tweedy directly about this IPC Classification project then please e-mail him at: seant@hms.ua.edu.au

Wheelchair Tennis

What tests will be done? – Testing will involve a data logger being attached to the spokes of the tennis wheelchair, cable ties will be used; therefore, no modifications to the wheelchair is required. Players will be asked to wear a heart rate band and match player will be captured via video.

How will the results be used? - The aim of this study is to analyse the activity levels of elite wheelchair tennis players in competitive match-play with heart rate and data logger information. The use of competitive match play is the only way in which this information can be collected to provide a realistic and meaningful representation of the demands of wheelchair tennis.

This project is in collaboration with members of Rory Cooper’s team at Pittsburgh (USA) where the data logger was developed – which measures distance covered, stops/starts and the speeds covered during wheelchair tennis match play. The data collection has also been supported by the International Tennis Foundation. We would like to welcome Paul Sindall to this research team and his PhD plans will appear in the next newsletter.

If you would like to know more about these research activities then please contact John at: J.P.Lenton@lboro.ac.uk

STOP PRESS: Research Seminar at Stoke Mandeville Hospital - 10th December 2009

Dr Vicky Tolfrey was invited by Lone Rose the Clinical Specialist in Physiotherapy, at Stoke Mandeville Hospital, to present an overview of the PHC research to the researchers and clinicians from the spinal unit. Dr Lettie Bishop contributed to the preparation and this session enabled people to gain a feel for the current research programmes that the ‘sport science’ members are involved with at the moment.
Mhairi Keil commenced her part time PhD studies in July 2008, she is supervised by Dr Vicky Tolfrey and Dr Susan Shirreffs, with technical input from Dr Katherine Brooke-Wavell. One year on, Mhairi updates us on her progress with her research and future directions.

In elite sport, small changes in body composition can have a marked effect on performance. It is important to be able to monitor changes in both fat mass and lean tissue, in order to assess the impact of training and nutrition programmes. Some of the most widespread methods available, such as skinfolds, bioelectrical impedance (BIA) and air displacement plethysmography (using the Bodpod) may not be sensitive enough to detect such changes. Therefore the purpose of this on-going, longitudinal study, was to assess the body composition of elite wheelchair athletes using these methods and to compare them with those obtained from using dual energy x-ray absorptiometry (DXA). The following questions will form part of Mhairi’s PhD:

- How accurate are some common and field based techniques at measuring the body composition of wheelchair athletes in comparison to DXA?
- How sensitive are techniques such as skinfolds, BIA, air displacement methods for detecting small changes in body composition of wheelchair athletes in comparison to DXA?

What are the physical characteristics of wheelchair bound athletes and how does their body composition change over a year in relation to training intensity and frequency?

How does bone mineral density change over a year in relation to training intensity and frequency?

Data collection for this study concludes in March 2010. The data obtained has proved valuable in supporting the GB Men’s wheelchair basketball players with their preparations for the 2009 European Championships. However, questions have been raised with regards to the accuracy of some the techniques employed in this study and once completed we will be able to determine its suitability for this particular cohort.

What has also become apparent from information obtained by DXA, is the low whole body bone mineral density of athletes who are wheelchair bound and how obtaining reliable and accurate readings of bone mineral density at specific high risk sites e.g. femoral neck and lumbar spine, is very difficult depending on the nature of the disability. This is an area that requires further investigation due to the implications it has on athletes risk of future injury from both a performance focus and a long term health and quality of life perspective. Therefore, future research is likely to continue to quantify the body composition of elite disabled athletes with a particular emphasis on bone health.

This PhD is supported by both the Great Britain Wheelchair Basketball Association and the English Institute of Sport. We would also like to thank those other National Governing Bodies involved with this research project.

Louise Croft (PhD student) has been working alongside Mhairi and assisted with the aforementioned testing sessions. Part of her studies have used the data obtained from the DXA scans to further the knowledge of energy expenditure in wheelchair athletes. An update of this research programme will be in the next newsletter.
PHC supports study into the requisite competencies of sport psychologists who work with elite athletes with a disability

By Zoe Calder, Dr. Chris Harwood and Dr. Jonathan Katz

Following the article in the Summer 2009 issue of the PHC newsletter, five of the eleven sport psychology consultants invited to take part in the study were available to be interviewed. All consultants had experiences of working with both elite able-bodied and athletes with disabilities.

The purpose of the study was to better understand the knowledge and practice-based competencies required in order to provide effective consultancy support to elite level athletes with disabilities.

Results illustrated a consensus amongst consultants that their style of consultancy remained unchanged across both populations of athletes, namely they did not, for example, change the overall structure of their consultancy when working with an athlete with a disability. The consultants interviewed, tended not to use psychological questionnaires and consequently there were no substantive differences between the psychological ‘tools’ used by consultants with elite able-bodied or athletes with a disability.

When providing psychological support to athletes with disabilities, consultants did not assume that an athletes' disability wholly defined them. Regarding self-identity, one consultant explained her approach towards each athlete to which she provides sport psychology support, ‘... they’re a person so I see the athlete and the person … I am asking about their background, how they got into sport and that doesn’t matter whether they have got a disability or not ….‘.

However, in terms of the knowledge required to work effectively with athletes with disabilities, a well-developed understanding of physical and mental impairment types enabled consultants to recognise when an athlete’s disability may (depending on the severity of the disability, if it’s acquired or hereditary and/or whether the disability is progressive or stable) impact their training or competitive performances. Furthermore, sport psychology consultants working within elite disability sport were perceived to require an understanding of the Paralympic Movement and how this defines the modern Paralympic Movement and disability sport in the UK. For example, a psychological demand of sport for an athlete with a progressive illness could be that, at a major competition, they are classified to a different classification group from that within which they have prepared for the event. Ironically the classification process, which seeks to ensure fair competition by grouping athletes according to their functional ability, can potentially evoke negative psychological responses within the athlete.

There was some difference of opinion amongst consultants interviewed about the competencies and training required to provide the best sport psychology support to elite athletes with disabilities. Athletes who have acquired their disability through an accident and have experienced trauma as a result can, for example, find that the trauma manifests itself in ways they perceive they have no control over during competition. Factors, such as how recently the disability was acquired and the situation that led to the athlete becoming disabled contribute to the level of trauma experienced by the athlete. In these situations consultants are required to provide extensive counselling support. However, the extent to which current Masters level Sport and Exercise Psychology programmes at UK universities deliver a satisfactory and agreed level of counselling training was a point demanding further investigation.

In addition to the recommendation that trainee postgraduate sport psychology consultants devote more time to counselling training, one consultant believed that exposure to clinical issues and training would further enhance the support provided to athletes with disabilities. One possible explanation as to why this point divided opinion amongst the consultants is because the majority of interviewees work within Sports Institutes and are part of an interdisciplinary team, which includes a clinically trained psychologist. Owing to this majority and despite consultants agreeing that knowledge of clinical issues does facilitate their work across both populations of athletes and not just athletes with a disability, consultants would refer clinical issues onto appropriately trained staff.

Hopefully the results of this study will stimulate further discussion and a systematic review of the required knowledge and competencies required to provide appropriate consultancy support to this population of elite athletes.

Zoe would like to thank the consultants who gave up their time to take part in interviews and acknowledge the Director of the PHC, Dr Vicky Tolfrey Director for supporting this study.

Zoe Calder has now successfully completed her MSc in the Psychology of Sport and Exercise at Loughborough University. The PHC would like to wish Zoe every success in her chosen future career.
Peter Carruthers is a former Paralympic athlete in wheelchair racing and won the Gold Medal at the Seoul Paralympic Games in 1988 and also competed at the Barcelona Paralympic Games in 1992. For his inspiration and influence on the lives of wheelchair users, sports people and spectators alike, Peter who already holds an MBE, was awarded an Honorary Master of Arts degree from Loughborough University in 1998.

The PHC is proud that Peter is associated with the Centre and has taken part in various tests to help further the research of the sport science research strand. Following a road accident in 1983, which left Peter as a full time wheelchair user, Peter pursued his love of sport and took a very critical look at the design and construction of the wheelchairs available to him. From modest beginnings Peter and his wife Sheila set up Bromakin a successful business that designs and manufacture specialist chairs for track and road racing, as well as chairs for basketball and rugby. For further information about Peter’s company, Bromakin, please visit: http://www.bromakin.co.uk/. Further information about Peter’s honorary degree can be found at: http://www.lboro.ac.uk/service/publicity/degree_days/degree_1998/carruthers.html

Q: As a former Paralympic athlete what do you feel is the future of disability sport?
‘Disabled youngsters who want to get involved in sport now have better defined routes as there are lots of avenues for them to follow. And for those who fall nicely into the classification system they can then have the potential to become great Paralympic athletes. However, for those doing sport recreationally it is much more difficult, regardless of age or ability. There are plenty of clubs for able bodied athletes but fewer for disabled athletes. Although schools provide opportunities in sport for disabled children, sport is often something that is given up afterwards or is difficult to get into again. There are initiatives for gyms to have adaptive equipment and sports centres, but these are often not taken up’.

‘In the future I imagine that elite sport will become more elite and that the current trends in Paralympic sport will be continued’.

Q: Being an associate of the PHC, what projects or initiatives do you think the Centre should be focussing on over the next few years?
‘I am more interested now in the long term studies and outcome of people who have participated in sport at any level. The areas that I am interested in are the social and health benefits that they get from it. Similarly it would be interesting to look at the people who are currently participating in sport and look at the benefits that they are getting from it now, and also the benefits they will get in the long term. If this was studied then a control group could be used who did not participate in any sports’.

Peter explained that the main benefit to participating in sport is the social aspect, as you can meet people with similar impairments.

‘This is especially helpful if you are newly disabled, as people in a similar situation can be inspirational and provide useful sources of information. These are the people who know the most about life in a wheelchair, such as daily living or how to compete in sports. This is a really valuable thing’.

Q: Over the past few years you have taken part in research tests for the University. Have these tests helped you to understand your own physiology better and put that knowledge into practice during exercise?
‘One of the first tests that I volunteered for was with Clyde Williams and Henryk Lakomy. In those very initial studies I learnt more about my own physiology than I learnt during my whole time at the hospital from the doctors. I learnt about the physiological changes that had happened as a result of the accident, such as my loss of adrenal function’.

Q: What is your favourite Paralympic moment?
‘Me on the podium – that was my moment then’, Peter was the Gold medal winner of the 100m at the Seoul Paralympics in 1988.

The PHC would like to thank Peter for agreeing to be interviewed and sharing his thoughts and opinions in the newsletter.
David Howe attended the North American Sociology of Sport Conference in Ottawa Canada, 4-7th November 2009. The conference theme 'Sport and Bodily Culture in Hard Times' led to numerous interesting session that were focused upon how we can use knowledge gained through social scientific research into sport can become more accessible to the public and ultimately help make the world a better place. David presented a paper entitled 'Marginality, Cerebral Palsy and the (Im)perfect Aesthetic of Paralympic Sport' where he argued that society needs to begin to appreciate unpredictable aesthetics if disability is going to be properly understood in the context of sport.

European Project Update

Riga, in Latvia, was the host city of the 3rd meeting of the European Standards In Adapted Physical Activity (EUSAPA) project (26th-29th November 2009) between all project partners. Two members of the Peter Harrison Centre (Dr. P. David Howe and Carla Silva) participated in this multidisciplinary work group, offering some sociological insight into the development of functional mapping for the Adapted Physical Activity profession.

Whilst the degree of consensus around the practical scope of an APA specialist tends to grow, there is also space for uncertainties over the way it can be beneficial for persons with disabilities in sport, education and rehabilitation in the various cultural contexts across Europe. Communication and cooperation with international partners was strengthened and developed through lively discussion and reflection.

Further information about the EUSAPA project can be found at: http://www.eusapa.upol.cz/web/index.php?option=com_frontpage&Itemid=83

Stop Press Items!!

Dr Vicky Tolfrey and Barry Mason attend the ESPRIT Project Launch.

On Wednesday October 28, 2009, ESPRIT which stands for ‘Elite Sport Performance Research in Training with Pervasive Sensing’ launched their newly funded EPSRC programme grant at The Royal Society in London. ESPRIT focuses on the following technologies:

- Generalised Body Sensor Networks
- Optimised Sensor Design and Embodiment
- Learning, Data modeling and Performance Optimisation
- Device and Technology Innovation

Both Vicky and Barry learnt a lot from technical demonstrations, and are exploring how ‘sensors’ could be included within their research programme to further the understanding of ‘manual wheelchair propulsion’ at a sporting level whilst applying this to the well-being and health of wheelchair users, partially with understanding over-use injuries. For more information please go to the website at: http://www.esprit-sport.org

Dr Vicky Tolfrey attends the 20thParalympicsGB Anniversary Celebrations.

On Wednesday November 4, 2009, ParalympicsGB hosted a 20th anniversary evening at their new offices in London, to celebrate the progress and development of Paralympic sport in Britain over the last two decades. The evening was opened by the Chairman Tim Reddish.

Vicky commented ‘I felt privileged to be invited as the former ParalympicsGB Physiology Consultant. It was great to see original footage that dated back to 1948 from previous Paralympic Games, and to listen to the discussions of Sir Philip Craven (President of the International Paralympic Committee) and Dame Tanni Grey-Thompson, that emphasized the fact that those that engage in competitive disability sport now are being recognized as ‘high performance athletes' at a similar level to those that compete in able-bodied sports'.
We would like to announce:

'A joint Peter Harrison Centre for Disability Sport and Home Country Sports Institutes Workshop'

The journey from rehabilitation to wheelchair sporting excellence: Considerations for the support practitioner.

Date: Thursday 27th May 2010

Venue: City of Manchester Stadium (this event will take place alongside the Paralympic World Cup)

Other Comments: This workshop is supported by the PHC and the Home Country Sports Institutes. It is endorsed by the British Paralympic Association as a relevant professional development opportunity for practitioners wishing to become involved in Paralympic sport.

Overview:
The first of a series of lectures that are aimed at broadening the understanding of Paralympic disability groups, will focus on Spinal Cord Injury. Topics will include the physiological consequences of spinal cord injury, respiratory function, nutritional issues, body composition, thermoregulation and strength and conditioning.

This workshop will be of interest to students, athletes, coaches, lecturers, science and medicine practitioners and anyone with an interest in the physiological responses to upper-body exercise and/or Paralympic sport.

Confirmed speakers include Dr Vicky Goosey-Tolfrey (Loughborough University), Dr Mike Price (Coventry University), Chris West (Brunel University), Laura Sutton (Teesside University) and Jeanette Crosland (Freelance Sports Dietitian).

For registration and costs please see the PHC website: http://www.peterharrisoncentre.org.uk/}

NEW BOOK : Out mid May 2010 published by Human Kinetics

Wheelchair Sport provides coaches, practitioners, and athletes with the information they need to compete and succeed in wheelchair sports. Written by top coaches, athletes, sport scientists, and specialists in sports medicine and physical therapy who work with Paralympic athletes, this resource offers:

- an explanation of the physiological differences between able-bodied and disabled athletes, and the physiological adaptations that result from training;
- guidelines for training that are customized to wheelchair athletes’ unique needs, including strength and conditioning, nutrition and hydration, and mental wellness;
- tips on the practical aspects of competing in wheelchair sports, such as optimising chair set-up and preparing for travel; and
- expert guidance in developing top-notch training programs for athletes of all skill levels.

People who use wheelchairs have greater opportunity than ever before to be physically active at the level of their choosing. Wheelchair Sport equips coaches, practitioners, and athletes to develop the minds and bodies of wheelchair athletes to their fullest, so they can achieve their athletic potential and enjoy their sports participation.