University of Strathclyde

FACULTY OF ENGINEERING

Collaborative Training Account

Final Report of 2008-2009 Sustainable Strategic Partnerships of Scale.

SPEEAD (Sporting Prosthetics for Everyday & Elite Athletes with a Disability)

National Centre of Prosthetics and Orthotics

Sarah A. Deans and Sandra Sexton

May 2010

University of Strathclyde

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1. INTRODUCTION

The National Centre for Prosthetics and Orthotics (NCPO) made application to the Collaborative Training Account (CTA) during August 2008. The Account's theme for 2008-2009 was Sustainable Strategic Partnerships of Scale.
The National Centre for Prosthetics and Orthotics was established in 1972 and offers training, education and research in the fields of prosthetics, orthotics and related aspects of the provision of assistive devices for those with physical mobility challenges. The National Centre is an internationally-known provider of undergraduate training and education within its field and provides vocationally-oriented courses to prosthetists and orthotists and the related healthcare professions.
The Strathclyde Collaborative Training Account was established by securing substantial funding from the Engineering and Physical Sciences Research Council (EPSRC) to provide company benefit through access to the postgraduate community and training. The Strathclyde CTA portfolio, in alignment with the University's Strategy for Excellence, has expanded considerably and encompasses a wide range of innovative Knowledge Exchange Partnerships including Masters Programmes and Research Associate Industrial Secondment (RAIS)
The SPEEAD programme leaders are Mrs Sarah Deans, Lecturer, NCPO and Mrs Sandra Sexton, Director and Head of Department, NCPO.

2. SUMMARY OF PROPOSAL

In considering a strategy for research development in prosthetics in the National Centre for Prosthetics and Orthotics, the importance of making involvement in sport more accessible to those athletically inclined became apparent. In preparation for the 2014 Commonwealth Games in Glasgow, there was also a clear need to herald a renewed focus on sport for those with mobility challenges and empower those who might never have participated to become involved[1]. There was a desire to build an enhanced national profile in terms of expertise and research in sporting prostheses and to promote our field of prosthetics. SPEEAD continues to have two aims:

- To build the level and nature of expertise and research capacity in the wider prosthetics practitioner community
- To address a postgraduate instructional course need in the UK prosthetics practitioner community

3. OUTLINE of ACTIVITY

Originally, the SPEEAD initiative defined two areas of activity derived from the aims and objectives. A third area emerged; that of providing knowledge transfer and engagement opportunities for prosthesis-users and their professionals.

3.1 Building Research Capacity

In order to build research capacity four key activities took place during the period from October 2009 until September 2009.

3.1.1 Development of the SPEEAD network

To explain how the project had scale, the SPEEAD project initiative relied on national (UK) strategic partnerships with key organisations and individuals who are at the forefront of best patient care.
The collaboration between NCPO within the Faculty of Engineering, and The Department of Sport, Culture and the Arts within the Faculty of Education was strengthened. Thus a cross faculty and cross disciplinary collaboration at the University of Strathclyde was realised.

Externally to the University, an initial cluster of experts with complementary backgrounds and an interest in sporting prosthetics formed partnerships and became members of the steering group. Three meetings were held to plan and deliver the research and knowledge exchange activities. Each partner contributed significantly in kind to the project with the vision of improving the quality of care in the prosthesis-user population.
To attract continuing interest in the SPEEAD work, a dedicated website was established with latest news and event presentations
www.strath.ac.uk/prosthetics/research/speeadsportingprosthetics
The SPEEAD network has grown nationally and expects international growth.

3.1.2 Recruitment & registration of postgraduate researchers

One Research Associate working in full-time employment in industry was recruited and registered for a part-time Masters of Philosophy at the University of Strathclyde. With the SPEEAD initiative being promoted at national and international professional events, two further researchers were attracted to register. Miss Donna Fisher, Mr Jamie Gillespie and Mr Oliver Smith were registered in March 2009 with the duration of study being 48 months. Sarah Deans is supervising all three postgraduate students and has herself undertaken PhD study with the Faculty of Education and under the supervision of Professor Nanette Mutrie, Professor of Exercise Psychology.
The student topics forming the SPEEAD research portfolio are:

- Prosthetic alignment considerations in everyday and elite athletic activities: a study of a population with lower limb deficiency.
- Profiling of active individuals with lower limb deficiency: how can improvements be achieved?
- Sporting prosthetic feet: does the prescription encourage and meet the demands of competitive sport participation?
- Motivations and barriers to participation in exercise & sport for the prosthesis user population.

3.2 Addressing postgraduate instructional course need

The project yielded new and unique Master of Science modules requiring external experts to author course material. This material is transferrable to NCPO's current postgraduate Open Learning degree programme which attracts mainly non-UK practitioners. Topics being authored during 2010 include:

- National and international adaptive sport
- Motivations and barriers to participation in sport
- Sporting prosthetics design and innovation
- Physiology of sports participation

The National Centre also has a portfolio of nine short courses ranging from one to five days in duration. Accreditation of these shorts courses is being investigated with a proposal that a one day short course would involve ten hours of study and equate to one credit value. There is a suggestion that accumulation of credits from successful consecutive short course attendance and study could lead to the award of postgraduate certificate.

3.3 Knowledge transfer and client and professional engagement

3.3.1 Delivery of Master Class skills training events

Steering Group meetings were convened to progress the planning, organisation and implementation of two skills training events held at distinguished centres of sporting excellence in Scotland[1] and England[2] during June 2009. The events were designed with the user of lower limb prostheses in mind and aimed to help participants become more knowledgeable about sports for people who have lower limb absence. In addition, the events aimed to increase prosthesis users' awareness of participation in everyday and competition level sports, increase understanding of current prosthetic issues in disability sports and enable users to experience various sporting modes through participation. A number of sporting and relaxation activities were staged at each event in which 50 users and professional healthcare staff participated. These included exercise warm-up and cool-down strategies, football, running, stationary rowing, stationary cycling, badminton, resistance training, table tennis and relaxation techniques. A questions and answers forum reiterated the talking points of the activity sessions for the participants and knowledge transfer was further consolidated by the expert faculty panel. Educational literature supplied at the events supported the participants learning (Appendix 1).

1 Murray Park Training Ground, Auchenhowie, Milngavie
2 Loughborough High Performance Athletic Centre, Loughborough University

3.3.2 Delivery of a Scientific Conference

A scientific conference was held at Hampden Park National Stadium in Glasgow on Thursday 3rd September 2009, the third event in the SPEEAD knowledge exchange portfolio. The conference was attended by 100 delegates comprising healthcare professionals, educators and researchers with the aim of exploring innovative concepts and examples of good practice in sporting prosthetics for the benefit of the user. The conference also allowed delegates an opportunity to exchange views and provide feedback on the needs of the active and athlete user. The programme included four national and international keynote speakers and two free paper sessions where eight researchers presented their work. A particular highlight of the programme was an interview and discussion forum which explored the thoughts and feelings of four people who use prostheses in everyday and higher level activities. Delegates commented *"it was interesting to hear about users' specific experience and how positive support can really have a benefit in their rehabilitation"* and "*the interview and discussion forum was an excellent session exploring the depth of patient experience with regards to sports participation. It was brilliant way to seek real examples and experiences of people with mobility challenges*". Appendix 2 Conference Literature.

4. IMPACT of ACTIVITY

According to the Scottish Government, projected trends suggest that the health of Scotland's population is unlikely to rapidly improve without change in a number of key areas. Increasing physical activity is one of the objectives which need to be delivered effectively. As such the SPEEAD project also recognises this need in the population who use prostheses; the majority of those who experience amputation do so due to peripheral arterial disease. By engaging the prosthesis user and practitioner communities in the Master Classes and Scientific Conference, the programme leaders have realised the improvement in psychological and physical wellbeing in users who attended the events and responded positively in their feedback. The SPEEAD project has had the greatest impact in this area. The project leaders believe that as a world leading education and research institution, the National Centre has an educational responsibility

to fulfil this brief for the benefit of the prosthesis user population and allow maximisation of potential.
By attracting three experts in prosthetics rehabilitation from high-profile external companies to study at Strathclyde, the SPEEAD initiative has proved to be a successful foundation for growth in collaborative partnerships. With redevelopment and implementation of the National Centre's postgraduate offerings, continued growth is expected with external collaborators.

5. CONCLUSIONS and ONGOING PROJECT ACTIVITY

In conclusion, the SPEEAD programme leaders on behalf of the National Centre have enjoyed implementing an innovative programme of engagement with external stakeholders. This activity has generated two national registrations and one international postgraduate registration at the University of Strathclyde. Most importantly, the project has succeeded in raising patient and healthcare professional awareness about the importance of physical activity, exercise and sport and how achievable improvements in health and wellbeing can be implemented in a supportive peer-led environment. Ongoing activity continues to concentrate on postgraduate module development in order to attract post-qualification rehabilitation professionals to study at the University of Strathclyde. Ongoing research serves to inform of the most appropriate ways of motivating those with mobility challenges to become and sustain health benefits from being more active.

Appendix 1 Master Class Educational Pack (Glasgow Example)

Faculty

SPEEAD MASTER CLASSES – STATION FACILITATORS & CONTRIBUTORS

Murray Park Training Ground, Auchenhowie, Milngavie, Glasgow

Saturday 13th June 2009

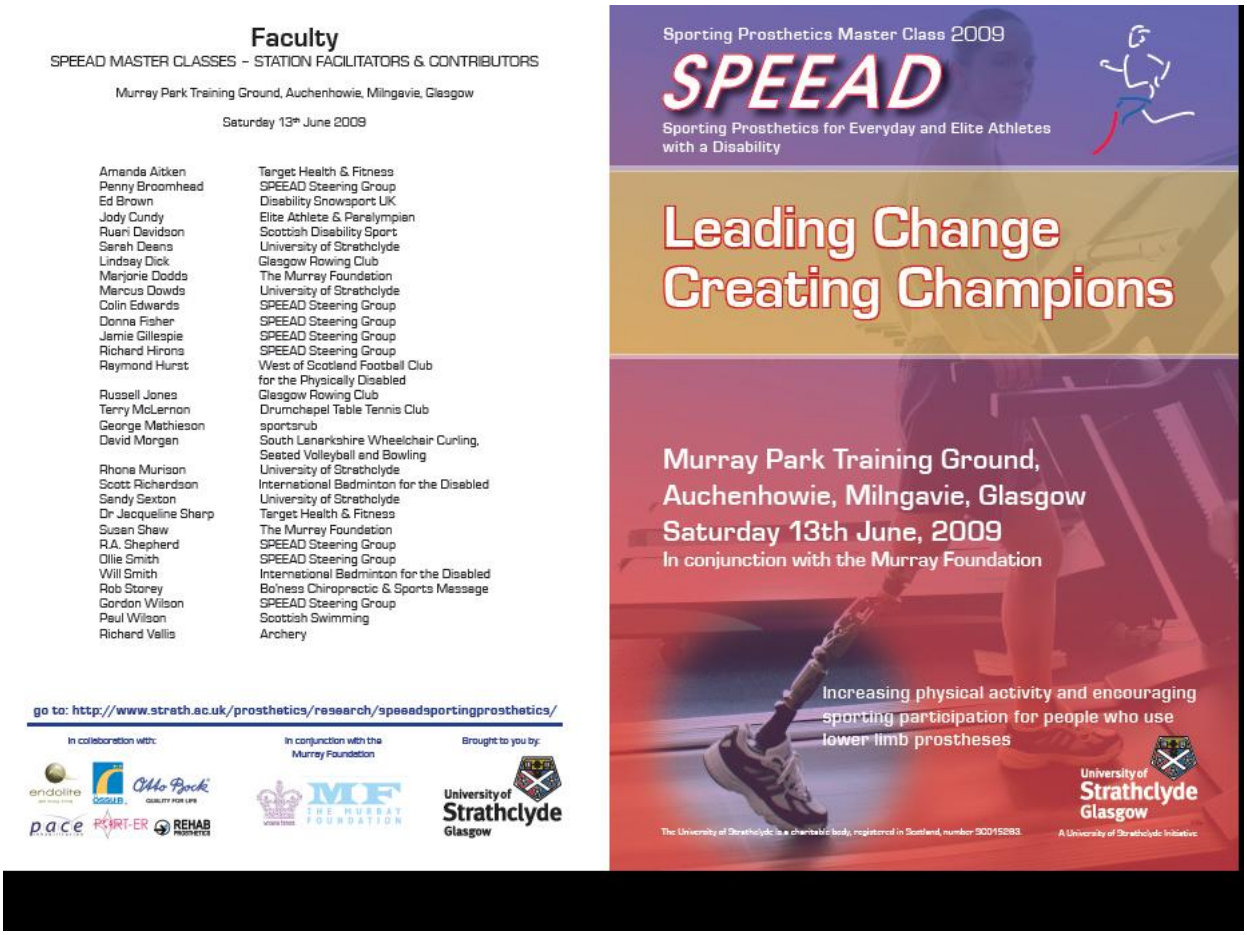
Amanda Aitken	Target Health & Fitness
Penny Broomhead	SPEEAD Steering Group
Ed Brown	Disability Snowsport UK
Jody Cundy	Elite Athlete & Paralympian
Ruari Davidson	Scottish Disability Sport
Sarah Deans	University of Strathclyde
Lindsay Dick	Glasgow Rowing Club
Marjorie Dodds	The Murray Foundation
Marcus Dowds	University of Strathclyde
Colin Edwards	SPEEAD Steering Group
Donna Fisher	SPEEAD Steering Group
Jamie Gillespie	SPEEAD Steering Group
Richard Hirons	SPEEAD Steering Group
Raymond Hurst	West of Scotland Football Club for the Physically Disabled
Russell Jones	Glasgow Rowing Club
Terry McLernon	Drumchapel Table Tennis Club
George Mathieson	sportsrub
David Morgan	South Lanarkshire Wheelchair Curling, Seated Volleyball and Bowling
Rhona Murison	University of Strathclyde
Scott Richardson	International Badminton for the Disabled
Sandy Sexton	University of Strathclyde
Dr Jacqueline Sharp	Target Health & Fitness
Susan Shaw	The Murray Foundation
R.A. Shepherd	SPEEAD Steering Group
Ollie Smith	SPEEAD Steering Group
Will Smith	International Badminton for the Disabled
Rob Storey	Bo'ness Chiropractic & Sports Massage
Gordon Wilson	SPEEAD Steering Group
Paul Wilson	Scottish Swimming
Richard Vallis	Archery

go to: http://www.strath.ac.uk/prosthetics/research/speeadsportingprosthetics/

In collaboration with: endolite, össur, Otto Bock, pace, RSRT-ER, REHAB

In conjunction with the Murray Foundation

Brought to you by: University of Strathclyde Glasgow



Acknowledgements

With warm appreciation to Rangers Football Club for kindly hosting this Master Class and to the Club colleagues based at Murray Park for their invaluable support and commitment shown in the event organisation and preparation.

SPEEAD Master Classes - Faculty

Activity		
Balance and Coordination (incorporating advice on beginners-level running)	Penny Broomhead, Colin Edwards & R A Shepherd	
Badminton	Scott Richardson & Will Smith	
Rowing	Jamie Gillespie, Lindsay Dick, Russell Jones	
Football	Raymond Hurst West of Scotland Football Club for the Physically Disabled	
Cycling	Jody Cundy & Ollie Smith	
Table Tennis	Terry McLernon Drumchapel Table Tennis Club	
Prosthetic Considerations	Donna Fisher, Richard Hirons, Gordon Wilson	
Strength & Conditioning	Marcus Dowds & Sarah Deans	
Health & Wellbeing	Dr Jacqueline Sharp, Amanda Aitken, Rob Storey, George Mathieson	
Information Station	Ed Brown	Disability Snowsport UK
	Ruari Davidson	Scottish Disability Sport
	David Morgan	South Lanarkshire Curling Club Seated Volleyball Bowling
	Richard Vallis	Archery
	Paul Wilson	Scottish Swimming

Other faculty members:
Marjorie Dodds
Rhona Murison
Susan Shaw
Sandy Sexton

Published June 2009

Manuel Design: Anne Dieter
Photographs: Joyce Martin (unless otherwise stated)

Appendix 2 Scientific Conference Literature

The need for SPEEAD

Sporting Prosthetics for Everyday & Elite Athletes with a Disability

University of Strathclyde Engineering

Sarah Deans and Sandra Sexton, National Centre for Prosthetics and Orthotics

Summary
A suite of user centred and enabling learning experiences at postgraduate level has been developed for postgraduate rehabilitation and sport professionals. These interventions have raised awareness of disability sports and encouraged new research activity in sporting prosthetics.

Background
We are all athletes in our own way; each individual has the right to fulfil their exercise potential. The White Paper on Sport (2007) by the Commission of European Communities stated that *"Sport has a greater influence than any social movement as a tool for health enhancing physical activity"*.

Importantly, the UK population with limb deficiency is predominantly elderly and has a sedentary lifestyle. Although there has been an increase in opportunities for these people to participate in sports due to better prosthetic components the number of sports prostheses users remain relatively low. This appears to be limited to limited skills specific to disability sport within the rehabilitation and sports professional communities.

The Commonwealth Games (Delhi, 2010; Glasgow, 2014) and the Paralympics Games (London, 2012) will allow us to capitalise on sporting awareness and allow for a stronger link between sport, health and education in the user and professional communities. The project team were awarded funding from the University of Strathclyde's Collaborative Training account and with this investment view the ability to secure the future for healthcare for the next generation.

"Sport is part of every man and woman's heritage and its absence can never be compensated for."
Pierre de Coubertin (1863-1937)
French pedagogue and historian, founder of the modern Olympic Games.

Many people with limb loss in the community are not sick, may be living with vascular conditions and have been living with amputation for some time, and could achieve much more in terms of building their exercise capacity or sporting experience. In some areas of the country there is good expertise in facilitating people with limb loss to get into exercise and sports, but in others there is a lack of knowledge and skills.

For rehabilitation professionals sports and exercise concepts are only just beginning to be introduced to undergraduate curriculum and for sports professionals, undergraduate education does not really focus on disability

Aims and objectives
The SPEEAD project aims to expand the knowledge base in the UK about sports, exercise and prosthetics so that sports and rehabilitation professionals can assist limb users to fulfil their exercise potential.

We aim to raise the standards of proficiency of professionals in this regard by facilitating a cross fertilisation of knowledge skills and experience. The project targets the postgraduate need and expect to widen the research capacity for Sporting Prosthetics.

Implementation
- Two Master classes have been designed as Sports Taster Days at two professional sporting venues bringing together prosthetic limb users and rehabilitation and sports professionals.
- A consciousness raising conference to bring together national and international experts to share best practice and research.
- A suite of postgraduate courses available as part of new NCPO Masters Offerings in 2010.
- New NCPO-led research has been initiated (motivations & barriers; technology use; technology design; sports profiling for prosthetic limb users)

A strategic partnership of scale
The 7 SPEEAD project partners include cross Faculty collaboration within the University between the Departments of Sports, Culture and the Arts and the National Centre for Prosthetics and Orthotics. Partners include leading prosthetics companies as well as individual national experts.
Further national and international sports and prosthetics expertise are brought together in the Scientific conference.

Conclusion
A positive spiral of collaboration with commercial and academic based experts has already generated new ideas and innovation within the sporting prosthetics research theme. This project has realised specialist knowledge exchange and a strengthening of the community of practice for sporting prosthetics.

Championing Sporting Prosthetics

References:

SPEEAD

Sporting Prosthetics for Everyday & Elite Athletes with a Disability

A Sports Taster Event to Promote Physical Activity and Sports Participation in Those Who Use Prostheses.

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PROGRAMME

09.30	**Registration and Refreshments**	
10.00	**Welcome and Introductions** Overview of activity and information stations	Sarah Deans Faculty
10.30	**Participants Warm-up** and refreshments	Amanda Aitken
11.00	**Activity participation** • Badminton • Balance and coordination (incorporating advice on beginners-level running) • Cycling • Football • Health and well being • Prosthetic considerations • Rowing • Strength and conditioning • Table tennis • Information station: **Archery** **Bowling** **Curling** **Scottish Disability Sport** **Snowsport** **Swimming** **Volleyball**	
13.30	**Lunch**	
14.15	Question and answers forum	Faculty discussion facilitated by Sandy Sexton
15.30	Closing remarks	Susan Shaw

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Curling

South Lanarkshire Wheelchair Curling Club was formed in 2002 and now has over 30 playing members. We are a mixed club who meet at Lanarkshire Ice rink, Hamilton every Monday at 12.30pm. We welcome new members of every ability and have coaching programmes to suit all. Each session lasts approximately two hours. The curling season runs from September till March. We play in club, league, national and international competitions and several of our members have represented their country in recent years.

Our events calendar shows the clubs competition schedule but many of our members simply want to take part in a recreational game of curling and enjoy the social aspects of the curling scene.
The gallery has a display of curling related photographs from throughout the season.

If you would like to find out more about curling with South Lanarkshire Wheelchair Curling Club, contact us through our website http://wheelchaircurling.co.uk/

We will be very pleased to arrange an initial session to let you try curling, or answer any of your questions.

Contact: David Morgan and Willem (Bill) Masterton

SPEEAD - Leading change, creating champions

Saturday 13th June 2009

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Strength and Conditioning

1) Why do we need Strength & Conditioning?
2) Benefits of Strength & Conditioning Training
3) F.I.T.T (Frequency, Intensity, Time, Type)
4) General Strength and Functional Strength Exercises for Sports
5) Equipment
6) Types of Strength & Conditioning Exercises

a) Free Weights

b) Body Weight

d) Resistance Bands/Cables

e) Medicine Ball

7. Exercise Plan (Examples)
   a) Gym-based (General Fitness)
   b) Home-based (General Fitness)

8) Sources/References
   i) www.advancedrehabtherapy.com/thered/amp1.html#7
   ii) Google Book Search: Prosthesis & Strength Exercises
   Book: Prosthetics and Orthotics Lower Limb and Spinal
   By Ron Seymour
   iii) Premier Training International, 2006
   iv) www.uksport.gov.uk
   v) The Complete Book of Personal Training, By Douglas Brooks, 2004
   vi) Fitness and Health (fourth Edition), By Brian J.Sharkey, 1997

Welcome

The SPEEAD Steering Group and The Murray Foundation warmly welcome you to this Sporting Prosthetics Master Class.

By attending this event you will have the opportunity to seek expert opinion and advice on a number of sports and activities on offer today. We hope that you might feel compelled to increase your daily activity and further your involvement in sports beyond your current level. This master class will contribute to the objectives of SPEEAD by facilitating a knowledge exchange event for prosthetics users and the professional community. It will also enhance a collaborative network of sports-related specialists who will contribute to professional education courses which will be offered through the University of Strathclyde.

Launched in October 2008, the innovative SPEEAD project aims to build the level and nature of expertise and research capacity in the wider disability sports community. The project steering group includes experts from academia, national and international prosthetics and orthotics companies and a charity involved in disability sports. All of the work has been made possible through funding from the University of Strathclyde's collaborative training account as well as through contribution from the companies who are represented on the steering group. It is a privilege to have their considerable support and you are encouraged to seek their thoughts on your own sporting prosthetics issues.

Finally, the event has been made possible through the Murray Foundation who kindly secured the prestigious sporting facilities of Murray Park. It is a pleasure to collaborate with the Murray Foundation in such a positive way and the Foundation's representatives are on hand to share their expertise with you today.

As attention is turned to the Olympics in London in 2012 and the Commonwealth Games in Glasgow in 2014, SPEEAD hopes that the obvious increase in sporting awareness will allow for a stronger link between sport, health and education in the user and professional communities. We hope you can continue to be part of it!

I hope you have fun, interesting and informative sports day.

Sarah Deans, SPEEAD Project Manager

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Badminton

Badminton is the world's fastest racket sport and it is an excellent past-time and/or competitive sport for a prosthetic user. Whether playing socially, at a local sports centre with friends, or competing nationally/internationally, it offers good exercise and fitness.

A relatively modest prosthesis can be used to take up the sport, with perhaps a more 'sporting' device would be appropriate when its limitations are met.

To get started, it is not necessary to play with other people who use prostheses. Contact your local sports centre/clubs to enquire about joining them.

In terms of competition, England, Ireland, Scotland and Wales each have their own governing body that each encompass disabled badminton in some form (some nations more than others!), with each country also hosting a round of the 4-Nations Disabled Badminton tournament each year.

Players are classified at their first event, based on their mobility and ability. There are standing* and wheelchair classes, although the majority of users play in the former.

*Upper and lower limb categories

For more information please click on the following weblinks:

www.parabadminton.org – International Badminton for the Disabled (IBAD)
www.badmintonengland.co.uk
www.badmintonireland.com
www.badmintonscotland.org.uk
www.welshbadminton.net

Images courtesy of IBAD

Murray Park Training Ground, Auchenhowie, Milngavie, Glasgow

Practical Tips for Sport and High Activity

If you are working hard, either taking part in sport, high activities or more leisurely activity, it is essential to take extra care to avoid your stump becoming sore. Make sure you have adequate suspension. You may need a little extra to prevent the socket from rubbing or just to give you confidence that your leg won't fall off.

If you work out really hard you will be surprised how much your stump can shrink, even if it has been stable for years. Take plenty of spare socks in your kit bag, to add if you need to. If your stump does shrink, it may then react by swelling once you take your prosthesis off. Take a compression sock (Juzo®) to put on after you shower until you are ready to put your prosthesis back on.

Save your newest and best socks for sport. Thinking of the impact your stump will receive on the court, pitch or track - it needs all the protection it can.

If you get really sweaty have enough socks to change into fresh, dry ones when you need to, that might be before you have finished. If you sweat and shrink then be prepared to add socks while you are playing. There are various preparations you can use to reduce the sweating. Unscented liquid talc is effective but difficult to find. The scent in anything you use could set off a skin reaction so avoid anything perfumed. Dri-Clor®, Anhydrol™ Forte and Mitchum® anti-perspirant' contain aluminium chloride, which actually stops the skin sweating; they work well but must be used with caution. You can source them from high street chemists. Using Hibiscrub as a skin wash may reduce sweating as well as keeping the skin clean and avoiding infection. It is available from chemists or ask your GP. Do patch test all of these first to make sure they do not cause a skin reaction.

You may want to try nappy liners. Unperfumed nappy liners, carefully wrapped around your stump can be very helpful. Apply them so they are not bunching within the sock and causing pressure. The moisture moves from your skin to the other side of the nappy liner & keeps the skin dry.

Take a blister kit, also available from your chemist, just in case the other precautions haven't worked. If a blister or sore appears repeatedly in the same place then contact your prosthetist. A slight adjustment may make all the difference.

Be prepared to fall over. You might not, but fear of falling could stop you achieving your best. If you do happen to fall try and land on your forearm, not your outstretched hand and then roll to the side.

Contact your Disablement Service Centre physiotherapist or prosthetist if you have any issues or questions.

Enjoy your Sport!

Penny Broomhead,
Clinical Physiotherapy Specialist in Amputee & Prosthetic Rehabilitation, June 2009

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Saturday 13th June 2009

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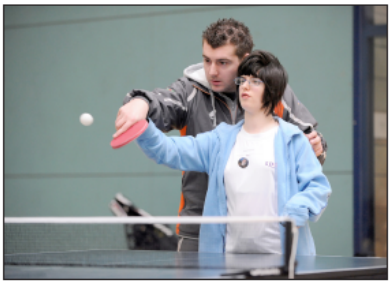
Table tennis

To find out more about table tennis in your area, please go to one of your national websites:

http://www.tabletennisscotland.com/
http://www.englishtabletennis.org.uk/
www.ttaw.co.uk/
www.irishtabletennis.com/

http://www.drumchapeltabletennisclub.com/
Contact: Terry McLernon, Senior Coach



Cycling

Cycling is not just an option for Paralympians, it's available for everyone. There are many reasons to cycle and with over 12000 miles of mapped cycle routes in the UK there's every reason to get on your bike. Cycling is a good activity for users as little or no modification is required to your prosthesis or bike and it is also a low cost activity - many people own or can borrow a bike already!

There are a few reasons to start pushing the pedals; it's good for you, regular cyclists enjoy a fitness level equal to that of a person ten years younger (National Forum for Coronary Heart Disease), and cycling at least 20 miles a week reduces the risk of heart disease to less than half that for non-cyclists who take no other exercise (British Heart Foundation). It is also good for your wallet; bicycles require no road tax, MOT or insurance. A good bicycle will last for years, if not decades if it's looked after and a bike can almost be parked anywhere. With the rising cost of fuel cycling is also a cost effective and attractive mode of transport.

There are a number of good websites to set you on your cycle path such as www.sustrans.org.uk. This website also has a search feature to enable you to find cycle tracks near you. www.britishcycling.org.uk is the website for anything cycling related in the UK - it has details of British cycling's club development programme called Go-Ride, aimed at encouraging clubs to help young cyclists enjoy their cycling in a safe, off-road environment. Details can be found on this website about your local cycling clubs. Finally www.bikeforall.net is a super resource for all your cycling needs.

Enjoy your cycling!

Contact: Ollie Smith, osmith@ossur.com
http://www.velovision.co.uk/cgi-bin/show_comments.pl?storynum=559

Image courtesy of Jody Cundy

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Football

Expertise is provided today by Raymond Hurst of the West of Scotland Football Club for the Physically Disabled. Please see http://www.westofscotlandfcpd.co.uk/ .

Another option for playing in the South is The Manchester United Foundation which aims to inspire potential and fulfil dreams. This ethos certainly comes into play with our Disability Football Program, MU Ability Counts. Our Ability Counts program aims to provide opportunities for anybody to play football. This sees us run 5 pan disability team and one impairment specific team for Amputee's. We are also beginning new projects to provide opportunities for Blind players and Wheelchair users to ensure our program truly is Football for all.

Our Amputee team is in partnership with Manchester Amputee Football club which was set up by Dave Tweed in 2000. We provide regular coaching sessions and entry into local pan disability leagues. Manchester Amputee football club is the most successful Impairment specific clubs in England with 12 current or former England Internationals.

We are now working with another Charity, The England Amputee Football Association (EAFA), to develop a national league. This will ensure opportunities continue and amputee football can realize it's potential.

At international level Amputee Football is played by single leg amputee's on crutches without prostheses for outfield players and arm amputee's for goalkeeper's , however we, along with EAFA , encourage any player who wants to play. The EAFA national league will be open to players who use prostheses and those who play on crutches, along with arm amputee's who wish to play outfield. We aim to take away the barriers and allow people to play football.

For further information contact:
adam.temple@manutd.co.uk or visit the EAFA website www.theEAFA.co.uk

Swimming

Swimming is open to men and women in all disability groups including physical, visual, intellectual and hearing impairments and is practiced in more than 80 countries.
At the Paralympic Games the eligible classifications are S1-S13. S1-S10 stands for swimmers with a Physical Impairment. S1 are swimmers with the most severe impairments e.g. those with very severe coordination problems in all four limbs or have no use of their legs, trunk, hands and minimal use of their shoulders, through to S10 who have a minimal impairment e.g. a minor limb loss of part of a limb. S11-S13 stands for those with a visual impairment. S11 being swimmers with no vision, S12 being swimmers can recognise the shape of a hand and have some ability to see. S13 swimmers who are the most sighted but are legally considered to be blind.
Swimming rules differ very little from non-disabled swimming. Depending on the impairment some swimmers may start with a dive or in the water. Visually impaired swimmers may have an assistant who will tap them from the end of the pool to warn them that they are approaching the turn or finish of the race.

The Paralympic programme encompasses all strokes and distances up to 400m including relays and individual Medley events.

The Great Britain (GBR) swimming team are current World Champions and have been the most prolific sport in terms of GBR team medals won at the last 5 Paralympic Games.

To find out more please contact:
England: disability@swimming.org
Scotland: p.wilson@scottishswimming.com
Wales: huw.griffiths@welsh-asa.co.uk

Download a Swimmer ID Tracker Form at: www.britishswimming.org to receive a free DVD and further information on how to get involved in disability swimming or visit the British Disability Swimming stand.

SPEEAD
Sporting Prosthetics Master Class 2009

Contact Us

Disability Snowsport UK, Cairngorm Mountain, Aviemore, PH22 1RB - 01479 861272

Position	Name	Email
Chief Executive Officer	Fiona Young	Contact through admin@disabilitysnowsport.org.uk
Administrator	Wendy Dall	admin@disabilitysnowsport.org.uk
Operations Manager	Debra Dorey	debbie@disabilitysnowsport.org.uk
Fundraising Co-ordinator Events & Trusts	Amy King	amyking@disabilitysnowsport.org.uk
Corporate Fundraiser & Ambassador	Susan Harrison	susanharrison@disabilitysnowsport.org.uk
Local Groups National Co-ordinator	Sophie Wood	sophiewood@disabilitysnowsport.org.uk
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Adaptive Instructor Manchester	Rachel Easton	rachel@disabilitysnowsport.org.uk
Adaptive Instructor Central Belt	Ed Brown	ed@disabilitysnowsport.org.uk

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Health and Wellbeing

Have you ever had a sports massage, or considered having one?

Allow us to give you some information about sports massage.

Firstly, "What is it?" - Sports massage uses basic and advanced hands-on techniques tailored by the practitioner to the specific needs of the client. The treatment can take place before, during or after an event, as part of a training programme, to enhance recovery from injury or aid recovery from travel. The techniques used can work on superficial or deep tissues and it is the deep tissue work that can cause some discomfort-Sports Massage therapists do not work to intentionally cause discomfort and deep tissue work will only be carried out after the area has been sufficiently prepared. It is common for only one or two areas to be worked on in any one session e.g. legs and feet.

"Who are the practitioners?"- A good question! Many therapists can state that they perform sports massage. It is important that potential clients check the training and qualifications of therapists (preferably before allowing them to work with you). It is recommended that therapists are fully qualified and members of the Sports Massage Association (www.sma.org.uk) and/or the Institute of Sport and Remedial Massage (www.theisrm.com).That way you can guarantee the therapist has completed an appropriately accredited course covering in depth the anatomy, physiology and pathology of common sporting or overuse injuries and the correct techniques for every situation. Membership of these organisations also ensures your therapist is keeping up to date with current practice as membership relies on completing a number of continuing professional development hours each year. However, unless the therapist has a medical qualification they cannot diagnose specific medical conditions and you may therefore be referred to an appropriate professional should your therapist feel this is necessary.

"What can Sports Massage do for me?"- Well that depends on what your requirements are. Before commencing treatment your therapist will ask questions designed to help them decide if treatment is appropriate and what techniques will be best for you. At events this may be a very brief discussion to ensure there are no injuries or contraindications to massage.

In a clinic setting sports massage can assist the following:

- Assist healing after an injury or improve a debilitating condition
- Help increase flexibility and range of movement of joints and helping prevent delayed onset of muscle soreness (DOMS)
- Can identify potential problem areas and treat them to prevent an injury from developing.
- Sports massage can also help boost the psychological state of clients by stimulating treatments prior to events or relaxing treatments following events.

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If the thought of deep tissue work is daunting then why not try a therapeutic massage (otherwise known as Swedish massage)? This massage is relaxing, helping to ease tension or stress and can promote a good night's sleep. A therapeutic massage often treats back, neck and shoulders, half body or full body and the strokes used are fairly superficial.

If you have any questions regarding the benefits or concerns of using massage in your training schedule then please do not hesitate to ask us.
We will be happy to talk to you or give you a "taster session" of massage.

The contact details of the therapists attending are listed below.
We hope you find the Master classes interesting, informative and motivating.

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Disability Snowsports

About Disability Snowsport UK
DSUK is a people-centred organisation with a unique sense of purpose: that anyone regardless of their disability can take part in and enjoy the thrill of snowsport.

For nearly 30 years we have applied exceptional know-how and adaptability to enable those with a disability to experience the joy of skiing alongside the able-bodied.

We provide exciting and life enhancing activities for individuals or groups who require adaptive equipment and/or special instruction and support.

Our work is acknowledged and applauded throughout the world because of our:

Knowledge
- Highly qualified and experienced instructional staff
- Up to date with the latest developments in adaptive skiing and equipment
- History
- We have been providing skiing activities since 1976
- We have a unique heritage and philosophy

Results
- Greater self confidence, improved co-ordination, increased independence, improved social skills, better decision making and improved self esteem are just some of the benefits gained
- People achieving their potential

We provide:
- Overseas activity weeks, adaptive snowsport school in Scotland, local groups, schools and youth programmes, support for the British Disabled Ski Team
- Training for instructors, volunteers and ski centre staff
- Advice and encouragement

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Forth Valley Disability Sport	**Graham Harvey** Forth Valley Disability Sport, Falkirk Community Stadium, 2nd Floor, Suite 2A, Westfield, Falkirk, FK2 9DX **Email:** info@fvds.org.uk **Tel:** 0771 754 5195
Glasgow	**Gordon McCormack** Glasgow Disability Sports Team, 3 Martha Street, Glasgow, G1 1JN **Email:** gordon.mccormack@glasgow.gov.uk **Tel:** 0141 287 5294 Fax 0141 287 4284
Highland Disability Sport	**Charlie Forbes** Highland Disability Sport, Ruthven House, ICT Unit, Drummond Road, Inverness, IV2 4NZ **Email:** Charlie.forbes@highland.gov.uk **Tel:** 01463 729 662 Fax: 01463 232 287
Lothian Disability Sport	**Gary Fraser** Disability Sport Coordinator, Lothian Disability Sport, Meadowmill Sports Centre, Tranent, EH33 1LZ **Email:** Gfraser1@eastlothian.gov.uk **Tel:** 01845 619 070 Fax: 01875 614 802
North Ayrshire S.A.D.	**Stephen Browning** North Ayrshire S.A.D., c/o Magnum Leisure Centre, Harbourside, Irvine, KA12 8PP **Email:** sbrowning@kaleisure.com **Tel:** 01294 317 457 Fax: 01294 317 461
Perth & Kinross Disability Sport	**Caroline Ness** Perth & Kinross Disability Sport, Balhousie Primary School - Room 10, Dunkeld Road, Perth, PH1 5DH **Email:** CMNess@pkc.gov.uk **Tel:** 01738 837 129
South Ayrshire Access to Sport	**Colin Duthie** Citadel Leisure Centre, South Harbour Street, Ayr, KA7 1JB **Email:** colin.duthie@south-ayrshire.gov.uk **Tel:** 01292 284 732 Fax: 01292 610 906
South Lanarkshire Disability Sport	**Miller Stoddart** South Lanarkshire leisure, Council Offices, North Stand, Cadzow Avenue, Hamilton, ML3 0LX **Email:** miller.stoddart@southlanarkshireleisure.co.uk **Tel:** 01698 476 131 Fax: 01698 476 120

Rowing

Please see additional information leaflet provided on Adaptive Rowing.

You can also contact Jamie Gillespie on jgillespie@pacerehab.com for further information.

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Running

The Biomechanics of Amputee Running

By Robert Gailey, PhD, PT

Content provided by The O&P EDGE - http://www.oandp.com/edge/

The biomechanics of amputee running is an interesting area that is useful in clinical application. With prosthetic developments such as the Flex-Sprint and C-Sprint designs permitting amputees of all levels of athletic ability to participate in recreational jogs or even competitive track, today's prosthetist and physical therapist must maintain a certain level of knowledge in this area.

Understanding what occurs during running will assist greatly with prosthetic socket fabrication, component selection, and the design of an appropriate training program that will assist the amputee in attaining their athletic goals.

This article will examine the fundamentals of amputee running. Many of the principles discussed apply to most sports requiring running or agility and speed-related movements, such as basketball or tennis.

The running cycle is divided into a stance and swing phase. During stance phase, the period from initial contact to mid-stance is referred to as the "absorption phase," where forces decelerate as the runner contacts the ground. From mid-stance to toe-off is known as the "propulsion phase," where the body generates the acceleratory forces that are carried over as the limb enters the swing phase. From mid-swing to terminal swing, the limb begins to decelerate as it returns to the absorption phase.

The beginning and end of each swing phase has a period of double-float, where neither limb is in contact with the ground. As a result, the stance phase accounts for less than 50 percent of the running gait cycle. As speed increases, the percentage of stance phase decreases.

ABSORPTION PHASE

TTA running absorption phase
The initial contact to mid-stance phase is regarded as the absorption period. In this period, the lower limb acts as a shock absorber for the body, reducing the considerable ground reaction forces passing through the limb, which can be two to three times greater than body weight.

As the foot strikes the ground, a backward force is generated by the strong contraction of the hip extensor muscles, while the hip abductors provide the necessary pelvic stability. Muscular stabilization, coupled with joint motion, creates a biomechanical spring that reduces the effects of the ground reaction forces.

Venue: National Sports Centre Inverclyde, Burnside Road, Largs
Dates: Monday 27 July – Wednesday 29 July 2009
Cost: For further information and costs please contact SDS head office.

As in previous years a varied and comprehensive programme of sports and recreation activities will be lined up for all participants throughout the camp.

Local/Branch Contact Information
Below are local area contacts for all branches within Scottish Disability Sport (SDS). For information about clubs and sporting opportunities available in your area, please find your nearest branch using the list below.

Aberdeen City Disability Sport	**Andrinne Craig** Active Communities Development Officer, Kincorth Sports Centre, Corthen Crescent, Kincorth, Aberdeen, AB12 5BB **Email:** acraig@aberdeencity.gov.uk **Tel:** 01224 879 759 Fax: 01224 814 58
Aberdeenshire Disability Sport	**Claire Bonner** Disability Sport Development Officer, Aberdeenshire Council, Disability Sport Office, Inveruria Town Hall Bothy, Aberdeenshire, AB51 3GN **Email:** Claire.bonner@aberdeenshire.gov.uk **Tel:** 01467 629 612 Fax: 01467 629 612
Angus Disability Sport	**Laura Smith** Angus Council, Neighbourhood, Sports and Countryside Services, The Yard Queensmwell Road, Forfar, DD8 3JA **Email:** smithlep@angus.gov.uk **Tel:** 01307 475 367 Fax: 01307 475 365
Scottish Borders Disability Sport	**Jed Renilson** Borders Disability Sport, Scottish Borders Council, Lancaster House, Newtown Boxwells, Melrose, TD6 0SA **Email:** JRenilson@scotborders.gov.uk **Tel:** 01835 824 000 ext 5354 Fax: 01896 662 711
Dumfries & Galloway	**Laura Vickers** Annandale & Eskdale Leisure Trust, 18 High Street, Annan, DG12 6AQ **Email:** laurav@annansportstrust.co.uk **Tel:** 01461 207 029
Dundee City Disability Sport	**Gordon Quinton** Dundee City Council, Leisure and Communities, Floor 13 , Tayside House, Crichton Street, Dundee, DD1 2RA **Email:** gordon.quinton@dundeecity.gov.uk **Tel:** 01382 432 348 Fax: 01382 432 329
Disability Sport Fife	**Norma Buchanan** Fife Sports Institute, Viewfield Road, Glenrothes, Fife, KY6 2RB **Email:** norma.buchanan@fife.gov.uk **Tel:** 08451 555 555 ext 444 909

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Scottish Disability Sport - Sporting Pathway

Scottish Disability Sport (SDS) is the national governing body for disability sport in Scotland. SDS has the responsibility to develop and support the sporting pathway for athletes with physical, sensory and learning disabilities.

Local Programmes:
Local disability sport officers are employed through a number of Local Authorities to develop local disability sport opportunities. There are 15 Local Branches in membership of SDS which provides areas with access to the SDS competition structure and additional funding support. A full list of local contacts is included.

National Events Programme:
Scottish Disability Sport runs a comprehensive annual calendar of events across a wide range of sports including athletics, Boccia, bowls, football, and swimming. A full list of events can be found on the SDS website www.scottishdisabilitysport.com

Key Sports:
SDS has a number of key sports for which annual Performance Plans are developed and funded through sportscotland. These focus on the development of performance athletes and how SDS can support the athletes and the sport effectively through high performance events, squad training, coach development and the transition into GB Programmes. The strand 1 sports are Athletics, Boccia, Bowls, Football, Swimming and Wheelchair Curling.

National Squads:
SDS has national squads in the sports of Athletics, Boccia, Bowls, Football, Swimming, and Wheelchair Curling. For a number of these sports there are also Development Squads and Junior Squads in place. The squads will train regularly and attend national and international competitions.

Athlete Academy:
Established in 2007 the Academy aims to enhance the continued development of our most promising athletes and players who have the potential to succeed in performance sport. At present there are 17 athletes across 6 sports inducted into the Academy.

A selection of SDS' junior events are listed below, a comprehensive list is available on the events page of the SDS website. If any one you know may wish to enter please contact your local branch contact details for local branches can be found at the back of this booklet.

Summer Camp:
Scottish Disability Sport in partnership with Capability Scotland and sportscotland, are delighted to be running the 9th Annual Summer Sports Camp for young people with physical disabilities and sensory impairments. The details of the three day camp are as follows:

When amputees run, there is an absence of an impact ground reaction force peak for the prosthetic limb. This reduction in ground reaction force suggests that amputees both absorb and generate less energy with their prosthetic limb. The reduction in energy generated with the prosthetic limb could be the result of a more passive use of the limb, the absorption of forces by the soft tissue encapsulated within the socket, or the presence of an isometric contraction by the muscles.

TFA amputee running absorption phase
As the transtibial amputee (TTA) strikes the ground with the prosthetic limb, a backward force is instantly created by the prosthetic-side hip musculature. This generates two to three times more work than the sound limb, partly to help move the body over the stationary foot, and partly to compensate for the loss of active plantarflexion at the ankle.

Probably the most notable difference between novice and well-trained TTA runners is that during initial contact, knee flexion is often absent in the novice runner. However, with proper training, strength, and adequate residual limb length, comparable knee flexion can be achieved with the prosthetic limb.

Length of the residual limb and the amount of muscle mass retained play a significant role in determining the transfemoral amputee's (TFA) running potential. This has become very apparent in recent years as knee disarticulation amputee runners appear to be extremely successful in competition. The additional power potentially available to knee disarticulation runners should not overshadow the need for athletic ability and training, which also play a very important role.

ACCELERATION PHASE

TTA running acceleration phase
From mid-stance to terminal stance and through initial swing is referred to as the "acceleration phase" of the running cycle, in which the body moves from stance phase energy absorption to acceleration. At this point, the majority of the forward propulsion of the body comes from the contralateral swing limb and the arms.

The well-trained TTA can achieve flexion-extension patterns similar to non-amputee runners during stance. Contraction of the quadriceps, coupled with the calf muscles, creates adequate knee stability. The use of the Flex-Foot "J" shape design, which permits controlled dorsiflexion, is considered by many to assist significantly with knee flexion control. In fact, the Flex-Foot has been found to provide a more normal pattern of hip and knee extensor muscle work throughout the stance phase.

The TFA's hip remains in a neutral position and is related to the extended prosthetic knee. To continue the advancement over the prosthetic stance limb, the hamstrings and gluteus maximus promote rapid hip extension. The amount of ankle dorsiflexion present is a direct result of the prosthetic foot design and alignment. Again, to date the Flex-Sprint design has delivered the maximum mechanical energy return for TFA runners.

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TFA running acceleration phase
As the hip reaches maximum extension, all movements are passive during terminal stance except for the hip adductors, which contract for pelvic stabilization. The peak plantarflexion is the result of the rapid movement of the tibia over the foot, creating a rigid lever in the foot to release the elastic energy. During running, over half the elastic energy is stored in two springs, the Achilles tendon and the arch of the foot.

The "elastic energy" found in the anatomical foot has been replicated to varying degrees in prosthetic feet. Dynamic feet have been found to generate two to three times greater elastic energy than SACH feet. Czernieki, Gitter and Munro (1991), defined spring efficiency as "the amount of energy generated, divided by the amount of energy absorbed." The spring efficiency of the SACH foot was found to be 31 percent, the Seattle foot had 52 percent, and the Flex-Foot had an impressive 82 percent. In comparison, the human foot has 241 percent spring efficiency, with the addition of the concentric plantarflexion contraction.

At terminal stance, the transtibial amputee runner's total muscle work on the prosthetic side is half that measured in the intact limb and in non-amputee runners. This is not too surprising, considering the absence of the plantarflexors. To compensate, there appears to be approximately a 75 percent increase in energy transfer from the amputee's intact swing phase leg.

The hip flexion is generated by a powerful contraction of the hip flexors. Stability and line of progression of the limb are maintained by stabilizing contractions of the hip abductor and adductor muscles. The mechanical work of the hip, or the energy generated by the intact hip flexors, was found to be more than twice the magnitude of that of non-amputee runners, with the prosthetic hip being somewhat greater than normal, but not as great as the intact side.

DECELERATION PHASE

TTA running deceleration phase
As the foot prepares to strike the ground, the muscles are preparing to accelerate the body forward, while also absorbing the ground reactive forces. The hip extensors work eccentrically to decelerate the thigh and leg during late swing, and extend the hip prior to and immediately upon initial contact. The hip abductors and adductors contract to stabilize the pelvis as the initial contact is approached.

Transtibial amputee runners tend to have lower peak flexion and extension angular velocities, as well as maximal hip and knee flexion angles. Premature extension of the knee during swing is also commonly observed. Socket design and suspension requirements have been identified as probable causes for the reduction in peak knee flexion, which in turn limits hip flexion. Creating a transtibial socket that provides both stance phase stability and swing phase mobility has been a perplexing task.

Front of Trunk Stretch
- Lie face down on the floor, fully outstretched
- Bring your hands to the sides of your shoulders and ease your chest off the floor, keeping your hips firmly pressed into the ground
- You will feel the stretch in the front of the trunk

Iliotibial Band Stretch
- Sitting tall with legs stretched out in front of you
- Bend the right knee and place the right foot on the ground to the left side of the left knee
- Turn your shoulders so that you are facing to the right
- Using your left arm against your right knee to help ease you further round
- Use your right arm on the floor for support
- You will feel the stretch along the length of the spine and in the muscles around the right hip

Quadriceps Stretch
- Lie face down on the floor, resting your fore-head on your right hand
- Press your hips firmly into the floor and bring your left foot up towards your buttocks
- Take hold of the left foot with the left hand and ease the foot closer to you buttocks
- Repeat with the right leg
- You will feel the stretch along the front of the thigh

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Calf Stretch
- Stand tall with one leg in front of the other, hands flat and at shoulder height against a wall.
- Ease your back leg further away from the wall, keeping it straight and press the heel firmly into the floor
- Keep your hips facing the wall and the rear leg and spine in a straight line
- You will feel the stretch in the calf of the rear leg
- Repeat with the other leg

Hip and Thigh Stretch
- Stand tall with you feet approximately two shoulder widths apart
- Turn the feet and face to the right
- Bend the right leg so that the right thigh is parallel with the ground and the right lower leg is vertical
- Gradually lower the body
- Keep your back straight and use the arms to balance
- You will feel the stretch along the front of the left thigh and along the hamstrings of the right leg
- Repeat by turning and facing to the left

Adductor Stretch
- Stand tall with you feet approximately two shoulder widths apart
- Bend the right leg and lower the body
- Keep you back straight and use the arms to balance
- You will feel the stretch in the left leg adductor
- Repeat with the left leg
- Groin Stretch
- Sit with tall posture
- Ease both of your feet up towards your body and place the soles of your feet together, allowing your knees to come up and out to the side
- Resting your hands on your lower legs or ankles and ease both knees towards the ground
- You will feel the stretch along the inside of your thighs and groin

The TTA will also contract the muscles of the lower limb in an identical pattern to the non-amputee during terminal swing. The knee should be slightly flexed and, as stated earlier, there will be a reduction in forces as the limb prepares to strike the ground.

TFA running deceleration phase
The TFA must land on an extended knee with the prosthetic limb. Initiating a backward force prior to contact will not only accelerate the body forward, but will simultaneously ensure that the knee will remain in extension. Many transfemoral amputee runners also adopt an extended trunk posture as they descend to the ground, although this is unnecessary.

TRUNK AND ARM SWING

For the amputee, arm swing is extremely important, yet often difficult to master. A concentrated effort must be made to maintain a symmetrical arm swing, especially as speed increases when the legs have a tendency to lose symmetry of movement.

Transfemoral amputees have a tendency to demonstrate increased abduction of the prosthetic-side arm, especially when the prosthetic lower limb is abducted. This adverse position of both the leg and the arm creates opposing forces that tend to impede forward momentum and increase the metabolic requirement. Poor medial/lateral socket stability will also require additional effort by the prosthetic-side arm and facilitate unwanted trunk movement.

This overview of the biomechanics of amputee running should help in socket fabrication and component selection, as well as in planning an appropriate training program. In turn, amputees will be better able to optimize their performance in order to achieve their athletic goals.

University of Miami School of Medicine "Department of Orthopaedics" Division of Physical Therapy

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Warm-up, Stretching and Cool-down

WARM-UP, STRETCHING AND COOL-DOWN

If someone who was sedentary mentioned that they were running a marathon in a few days time, most people would think they were insane and setting themselves up for severe injury.

Every time you exercise your body needs time to adapt to exercise, your cardiovascular and musculoskeletal systems need to build the stamina, flexibility and adaptability required for your chosen activity. You also need to prepare and adapt psychologically and nutritionally too. You will perform better and reduce risk of injury if you warm up your muscles before exercise. You will also recover faster if you cool down at the end of exercise and this is where stretching has a role.

There has been a lot of discussion regarding the pros and cons of stretching over the past few years. Most of the recent studies have highlighted the need for further good quality research before definite conclusions can be drawn.

However, it is apparent that the age, weight and physical condition of the participant is important in considering the contribution stretching can make to performance and reducing your injury risk. It is also apparent that appropriate sports specific stretches need to be used and so it is important that any stretching movement is performed correctly and at an appropriate time.

There are two main types of stretches:

DYNAMIC
Involving controlled movement of body parts with gradually increasing speed of movement or reach or both together, for example, arm swings, neck circles. These improve dynamic flexibility and power). Dynamic stretching, targeting the joints and muscles mainly involved in the activity you are about to participate in, will help prepare your body and can improve performance.

STATIC (also called **isometric** stretching)
These do not use motion but involve the targeted muscle groups being lengthened until the pulling or "bind" is felt, and then tensed whilst resisting against an immovable force for example a wall. Generally, static stretching should not be performed in the warm up phase as it does not help increase muscle power and can be detrimental to performance. Static stretching is most useful in the cool down phase.

Shoulder and Triceps Stretch
- Stand tall, feet slightly wider than shoulder-width apart, knees slightly bent
- Place both hands above your head and then slide both of your hands down the middle of your spine
- You will feel the stretch in the shoulders and the triceps

Side Bends
- Stand tall, feet slightly wider than shoulder-width apart, knees slightly bent, hands resting on the hips
- Bend slowly to one side, come back to the vertical position and then bend to the other side
- Do not lean forwards or backwards
- Abdominal and lower back muscles
- Lie face down on the ground in a prone position
- Lift your body off the ground so that you are supported only by your forearms and toes. The elbows should be on the ground and should be almost directly below your shoulders. Your forearms and hands should be resting on the ground, pointed straight ahead, toes and feet should be shoulder width apart and your head in line with your spine Contract your gluteus (bum) muscles gently. Hold for ten seconds
- Lift your right arm off the ground, straighten it and point it straight ahead, holding it in the air for 10 seconds
- Return to the starting position
- Repeat with the left arm
- Return to starting position
- Lift your right leg off the ground and hold it there for ten seconds (keep back straight).
- Return to starting position
- Repeat with left leg
- Return to starting position
- lift your right arm and left leg simultaneously and hold them in position for ten seconds
- Return to starting position
- Lift your left arm and right leg simultaneously and hold them in position for ten seconds
- Return to the starting position

Hamstring Stretch
- Sit on the ground with both legs straight out in front of you
- Bend the left leg and place the sole of the left foot alongside the knee of the right leg
- Allow the left leg to lie relaxed on the ground
- Bend forward keeping the back straight
- You will feel the stretch in the hamstring of the right leg
- Repeat with the other leg

Murray Park Training Ground, Auchenhowie, Milngavie, Glasgow

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STATIC STRETCHING EXERCISES

Research work detailed in Medicine & Science in Sport and Exercise 33(3), pp354-358 and Journal of Strength and Conditioning Research, Vol 15 (1): 98-101 suggests that the use of dynamic stretches - slow controlled movements through the full range of motion - are the most appropriate exercises for warming up. By contrast, static stretches are more appropriate for the cool down.

The Exercises
The following are examples of general static stretching exercises that could form part of the cool down program at the end of a training session when stretches are held for 10 seconds or to improve the mobility and range of movement when stretches are held for 30 seconds. In all exercises breathe easily whilst performing them.

Chest Stretch
- Stand tall, feet slightly wider than shoulder-width apart, knees slightly bent
- Hold you arms out to the side parallel with the ground and the palms of the hand facing forward
- Stretch the arms back as far as possible
- You should feel the stretch across your chest

Biceps Stretch
- Stand tall, feet slightly wider than shoulder-width apart, knees slightly bent
- Hold you arms out to the side parallel with the ground and the palms of the hand facing forward
- Rotate the hands so the palms face to the rear
- Stretch the arms back as far as possible
- You should feel the stretch across your chest and in the biceps

Upper Back Stretch
- Stand tall, feet slightly wider than shoulder-width apart, knees slightly bent
- Interlock your fingers and push your hands as far away from your chest as possible, allowing your upper back to relax
- You should feel the stretch between your shoulder blades

Shoulder Stretch
- Stand tall, feet slightly wider than shoulder-width apart, knees slightly bent
- Place your right arm, parallel with the ground across the front of your chest
- Bend the left arm up and use the left forearm to ease the right arm closer to you chest
- You will feel the stretch in the shoulder
- Repeat with the other arm

It is important to appreciate that a warm up and cool down should incorporate more than just stretching. The aim of warming up is to prepare the body for the activity ahead by loosening muscles and tendons to increase joint range of movement, contractility and elasticity of muscles and to increase blood flow to the muscles. This involves raising the body temperature so warm-up routines should begin with very light aerobic activity, for example jogging on the spot for 5-10 minutes. Dynamic stretching moves should then be used to warm up the muscles and connective tissues, loosen joints, and help psychological readiness for the main event.

Following exercise the cool down should not only consist of stretching. An important part of the recovery process is helping reduce muscle fatigue and soreness. This soreness is caused by the build up of lactic acid as a result of the muscle exertion during activity. Ideally, 10-20 minutes of light aerobic activity specific to the tasks just completed, followed by light dynamic stretches and then finally static stretches can all help reduce cramping, soreness and tightening of the muscles.

It is important that you are performing the stretches properly and may require supervision or assistance with stretches until you master them.

Incorrect stretching can result in instability of joints, over stretching of ligaments, muscle/tendon tears, pain. Other useful stretching techniques not mentioned here can be used. This guide is concentrating on some of the basic techniques to incorporate into your routine.

Here are some examples of stretching exercises.

The following is with permission from "SportsCoach@www.brianmac.co.uk" http://www.brianmac.co.uk/dynamic.htm and http://www.brianmac.co.uk/stretch.htm

DYNAMIC STRETCHING

Initially it is best to perform dynamic stretches with supervision and advice from your coach or instructor as they will be able to advise you which stretches are appropriate for targeting the muscles and joints you are about to use most.

Neck Mobility

- Flexion/Extension - Tuck your chin into your chest, and then lift your chin upward as far as possible. 6 to 10 repetitions
- Lateral Flexion - lower your left ear toward your left shoulder and then your right ear to your right shoulder. 6 to 10 repetitions
- Rotation - Turn your chin laterally toward your left shoulder and then rotate it toward your right shoulder. 6 to 10 repetitions

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Shoulder Circles
- Stand tall, feet slightly wider than shoulder-width apart, knees slightly bent
- Raise your right shoulder towards your right ear, take it backwards, down and then up again to the ear in a smooth action
- Repeat with the other shoulder

Arm Swings
- Stand tall, feet slightly wider than shoulder-width apart, knees slightly bent
- Keep the back straight at all times
- Overhead/Down and back - Swing both arms continuously to an overhead position and then forward, down, and backwards. 6 to 10 repetitions
- Side/Front Crossover - Swing both arms out to your sides and then cross them in front of your chest. 6 to 10 repetitions

Side Bends
- Stand tall with good posture, feet slightly wider than shoulder-width apart, knees slightly bent, hands resting on hips
- Lift your trunk up and away from your hips and bend smoothly first to one side, then the other, avoiding the tendency to lean either forwards or backwards
- Repeat the whole sequence sixteen times with a slow rhythm, breathing out as you bend to the side, and in as you return to the centre

Hip circles and twists
- Circles - With your hands on your hips and feet spread wider than your shoulders, make circles with your hips in a clockwise direction for 10 to 12 repetitions. Then repeat in a counter clockwise direction
- Twists - Extend your arms out to your sides, and twist your torso and hips to the left, shifting your weight on to the left foot. Then twist your torso to the right while shifting your weight to the right foot. 10 to 12 reps on each side

Half Squat
- Stand tall with good posture holding your hands out in front of you for balance
- Now bend at the knees until your thighs are parallel with the floor
- Keep your back long throughout the movement, and look straight ahead
- Make sure that your knees always point in the same direction as your toes
- Once at your lowest point, fully straighten your legs to return to your starting position
- Repeat the exercise sixteen times with a smooth, controlled rhythm
- Breath in as you descend, and out as you rise

Leg Swings
- **Flexion/Extension**- Stand sideways onto the wall
- Weight on your left leg and your right hand on the wall for balance
- Swing your right leg forward and backward
- 10 to 12 repetitions on each leg

- **Cross-Body flexion/Abduction** - Leaning slightly forward with both hands on a wall and your weight on your left leg, swing your right leg to the left in front of your body, pointing your toes upwards as your foot reaches its furthest point of motion
- Then swing the right leg back to the right as far as comfortable, again pointing your toes up as your foot reaches its final point of movement
- 10 to 12 repetitions on each leg

Lunges
- Standing tall both feet together (starting position)
- Keeping the back straight lunge forward with the right leg approx 1 to 1½ metre
- The right thigh should be parallel with the ground and the right lower leg vertical
- Spring back to the starting position
- Repeat with the left leg
- 12 to 16 repetitions on each leg

Ankle Bounce
- **Double leg bounce** - Leaning forward with your hands on the wall and your weight on your toes, raise and lower both heels rapidly (bounce)
- Each time, lift your heels one to two inches from the ground while maintaining ground contact with the ball of your feet
- 12 to 16 repetitions
- **Single leg bounce** - leaning forward with your hands on a wall and all your weight on your left foot, raise the right knee forward while pushing the left heel towards the ground
- Then lower the right foot to the floor while raising the left heel one or two inches
- Repeat in a rapid, bouncy fashion
- 12 to 16 repetitions on each leg

This exercise is taught by the United States Tennis Association's player-development program. It is a good exercise for many athletes, even golfers. Do it immediately after your aerobic warm-up and as soon as possible before your workout. Other advanced dynamic exercises available.

STRAIGHT-LEG MARCH (for the hamstrings and gluteus muscles). Kick one leg straight out in front of you, with your toes flexed toward the sky. Reach your opposite arm to the upturned toes. Drop the leg and repeat with the opposite limbs. Continue the sequence for at least six or seven repetitions.

HANDWALKS
(for the shoulders, core muscles, and hamstrings)

Stand straight, with your legs together. Bend over until both hands are flat on the ground. "Walk" with your hands forward until your back is almost extended. Keeping your legs straight, inch your feet toward your hands, then walk your hands forward again. Repeat five or six times.

Appendix 2 SPEEAD Conference Pamphlet

SPEEAD
Sporting Prosthetics National Conference 2009

PROFILES- KEYNOTE SPEAKERS

Brian Bartlett

Brian Bartlett is from Seattle, WA, USA and is a prosthesis user. He has a background in snow skiing and became a sports prosthetics developer, competing in downhill mountain biking on "The Bartlett Tendon", a universal knee system. Brian says "It is possible, everything is possible. It's about overcoming obstacles and accomplishing your goals every day. This isn't a mission that I chose; this mission chose me".

Professor Helena Burger

Helena Burger, MD, PhD is Professor of Physical and Rehabilitation Medicine and Medical Director of the Institute for Rehabilitation, Republic of Slovenia. She has a special interest in outcome measurements in rehabilitation of people following amputations of upper and lower limbs. Helena is the medical doctor for the Slovenian Paralympic team and has been in attendance at four Paralympic games with the national team in Atlanta, Sydney, Athens and Beijing.

Professor Nanette Mutrie

Nanette Mutrie is Professor of Exercise and Sport Psychology at the University of Strathclyde, Glasgow and is also Visiting Professor at the MRC Social and Public Health Sciences Unit, Glasgow University. She trained as a Physical Education teacher and after working in schools, she went to Pennsylvania State University, USA with a Fulbright scholarship to pursue a PhD achieved in 1986. Since this time Nanette has worked at Glasgow University and has been in post at the University of Strathclyde for three years.

Gilmour Stevenson

Gilmour Stevenson is Chair of the UK Strength & Conditioning Association, with over 30 years of working within elite sport, managing and delivering coach education programmes. Formerly Principal of the Fife Institute of Physical and Recreational Education, Gilmour is now Director of his own company Sportspecifix Ltd. which focuses on high performance sports coaching, coach education and strength and conditioning. In recent years, Gilmour has had the pleasure of working with those athletes who use both lower limb and upper limb prostheses, and welcomes the opportunity to speak with those who are involved in the rehabilitation of prosthesis users.

http://www.strath.ac.uk/prosthetics/research/speeadsportingprosthetics/

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Brought to you by: University of Strathclyde Glasgow

Sporting Prosthetics National Conference 2009

SPEEAD

Sporting Prosthetics for Elite and Everyday Athletes with a Disability

Championing Sporting Prosthetics

Leading Change Creating Champions

Hampden Park National Stadium,
Glasgow, Scotland
Thursday 3rd September, 2009

Increasing physical activity and encouraging sporting participation for people who use lower limb prostheses

University of Strathclyde Glasgow

The University of Strathclyde is a charitable body, registered in Scotland, number SC015263. A University of Strathclyde Initiative

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REGISTRATION FORM

Please register me as a SPEEAD conference delegate

Prof/Dr/Mr/Mrs/Ms/Other .....

Surname: ..... First Name: .....

Business Address: .....

.....

Post Code: ..... Business Telephone: .....

Profession: .....

Position Held: .....

E-mail Address: .....

Home Address: .....

.....

Post Code: ..... Mobile Telephone: .....

Please indicate any dietary requirements or additional support needs you may have:

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Please return this form to Linda Gilmour
National Centre For Prosthetics And Orthotics
Curran Building
131 St. James' Road
Glasgow G4 0LS
Scotland
t: 0141-548 3433
f: 0141-552 1283
e: linda.gilmour@strath.ac.uk
Forms to be returned Friday 21st August, 2009

Championing Sporting Prosthetics

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Sporting Prosthetics National Conference 2009

PROGRAMME

09.00 – 09.30	**Registration and Refreshments**	
09.30 – 09.45	**Welcome**	**Conference Chair: Sarah Deans**
09.45 – 10.00	The Opening Address The Principal and Vice Chancellor, University of Strathclyde	**Professor Jim McDonald**
10.00 – 10.30	Psychology of Physical Activity and Sports Participation: Motivations and Barriers	**Keynote Speaker: Prof Nanette Mutrie**
10.30 – 11.00	Inclusive Coaching and Conditioning: empowering the champions of the future	**Keynote Speaker: Gilmour Stevenson**
11.00 – 11.30	**Morning Coffee**	
11.30 – 12.30	**Free Paper Session 1** A Comparative Study of Adaptive Rowing in Prosthesis Users Prosthetic alignment in sport: a review of the literature Physical activity in people with Type II diabetes	**Caroline Ward** **Donna Fisher** **Alison Kirk**
12.30 – 13.00	Sport and Recreation Activities of People with Limb Deficiency: USA perspectives	**Keynote Speaker: Brian Bartlett**
13.00 – 14.00	**Lunch & Exhibition**	**Afternoon Session Chair: Sandra Sexton**
14.00 – 14.45	**Interview and Discussion Forum led by:** The Users of Lower Limb Prostheses: their perspectives **Colin Edwards, David Malone, Sean McGarvey and Linda Runcie**	**Jamie Andrew**
14.45 – 15.15	Paralympic Athletes: inspirational champions or unrealistic role models?	**Keynote Speaker: Prof Helena Burger**
15.15 – 15.45	**Afternoon Tea and Exhibition**	
15.45 – 16.15	**Free Paper Session 2** Sports profiling for people with limb deficiency Prosthetic feet for sports: a review of the literature Group participation in sports for prosthesis users	**Jamie Gillespie** **Oliver Smith** **Sarah Deans**
16.15 – 16.45	**Summary & Closing Remarks**	**Sandra Sexton**
16.45– 18.00	**Drinks Reception and Prize-giving for Best Poster** **Complimentary Visit to 'The Hampden Experience' (Scottish Football Museum)**	
18.00	**Close**	