GB Paralympic swimming squad - physiological preparations for 2012

The GB Paralympic swimming squad captured the hearts of Britain's public with their record breaking performances at the Beijing Olympics in 2008. As one of the country's largest and most competitive paralympic sports prepare for the 2012 Games, Claire-Marie Roberts catches up with Catherine Gilby, English Institute of Sport Physiologist, to find out more about their preparations.

After achieving the 2008 medal target in Beijing, the expectations of the squad will be inevitably higher for London 2012. What lessons did you learn from the squad's performance in the Beijing Olympics?
Beijing was a successful Paralympics for the swimming team and the biggest lesson from the experience is not to be complacent. The rest of the world is catching up in terms of performance in the pool as well as the support teams they have in place. As a team, there were a number of lessons learned from the Beijing experience. These have been converted into key action points for the squad moving forward to London 2012. Getting the basics right, (e.g., achieving trainability and leading an athlete lifestyle); maximising performance opportunities (e.g., using every training session and identified competition to refine performance strategies); and showing progress in performance year on year (e.g., setting athletes the task of performing better at the trials for this year's major meet than they did at last year's major meet) are just a few of the constructs we commit to as a team.

How has your work as a Physiologist developed with the team since 2008?
Since Beijing 2008, physiological support with the team has really evolved. There has been an ongoing focus to continue to get the basics right, using physiological monitoring to identify where potential gains can be made in the training programme as well as tracking changes in performance. A significant development with the support are the projects that we are running to have a performance impact in 2012. This has included working with an Italian company to develop a waterproof heart rate telemetry system, which gives feedback in real-time during a training session. We're also investigating the benefits of altitude training and altitude simulation with athletes in different classification groups. There are a number of physiological projects in the pipeline for optimal preparation for London 2012. However, due to the competitive nature of Paralympic sport, it is important that we keep these under wraps in order to maintain our competitive edge. Come back to me after the Games!

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What is the single, most important intervention you make with the swimming squad to ensure their success in competition?
I think that I make the biggest difference to coaches and athletes with the input I give to the optimisation of their weekly, monthly and annual plans. This includes drilling down to the detail of each training session and being able to make key recommendations on how the training set can be manipulated in order to maxmimise the training effect. This may include using the Hosand heart rate telemetry system to evaluate how much actual 'work time' an athlete spends training at their lactate threshold intensity. We can then manipulate the work and rest intervals to ensure that they are completing sufficient work at this intensity. This also ensures that appropriate modifications are made to each training set for different classifications – 100m for an S1[a] athlete at (1:30 min) is a completely different type of work interval to an S10[b] athlete (55s) (See Box 1). This also includes working with the Lead Strength and Conditioning coach for British Disability Swimming to ensure effective integration of land-work into the weekly training programme to minimise the liklihood of one training session compromising another. In addition, assisting coaches to look at the bigger picture and planning their training year effectively ensures that the athletes perform to the best of their ability at the major meet for that year.

What do you think are the key physiological challenges that are faced by the Paralympic swimmers you work with?
I work with a wide range of athletes with various disabilities. The key physiological challenges can range from certain medications having an impact on various physiological responses to exercise to athletes who are missing the majority of their limbs and the implications that this has on their physiological responses to exercise. For example, certain medications can significantly influence the heart rate response to exercise. This has particular significance when monitoring a training set or putting the athlete through an exercise test. As well as having implications for how these athletes can maximise their training , it has huge repercussions on their ability to recover effectively from metabolic and neuromuscular fatigue. When we are looking at a 10-day racing programme at the London 2012 Paralympic Games, it is critical that we continue to refine individual recovery strategies to ensure that our athletes are as fresh at the end of the meet as they are at the start.

What does this mean in terms of your involvement?
In terms of my involvement, it necessitates multidisciplinary team working in order to support athletes effectively, especially given some of the key physiological challenges that a number of our athletes face. However, I work with elite athletes first and foremost and the focus is always on the ability of the individual I am working with. Of course it is crucial to be aware of the physiological consequences of an athlete's disability, however, this forms a part of the initial needs analysis of any athlete on the programme. It has challenged some of the more traditional training and physiology concepts that were taught during my University years but it continues to keep the support work stimulating, with the need to look for creative and innovative solutions to problems.

For example, my learning at University covered a large amount of practical laboratory testing with athletes. It covered key concepts such as the rationale behind including work/rest intervals of a specific duration and the key physiological measures that should be taken. A key innovation within the programme a number of years ago was the modification of a traditional 7 x 200m incremental step test in the pool. As you can appreciate, 200m repeats would be relevant to some athletes and not others based on their classification. Modifications were made to the protocol to accommodate all classifications to adhere to the traditional principles outlined during my teaching but to also be relevant to the athlete group I was working with.

How do you ensure as a member of the support team that all of your involvement has a positive impact on *performance*?
One of the key constructs of our team is that the support is coach-led. Everything that we do is done in conjunction with the coach and this is critical in ensuring a positive impact on performance. I am part of an excellent sport science and medicine team working to support the coaches and athletes on the programme. We meet on a regular basis to review our work and it is within this forum that we put together project plans for any work we are doing, which will ultimately identify how we will measure success. It is difficult to be specific about measures that indicate success of our work as they will be different in every situation. However, the fundamental markers that measure success are the same for the support team as they are for the sport – personal bests in competition and gold medals at the benchmark meet.

How would you explain the importance of physiology support in the swimmers' training and performance programme?
Physiological support is of critical importance in an athlete's training and performance programme. This can be explained by its positive impact day-to-day right through the bigger picture of the 4-year Paralympic cycle. Day-to-day impact occurs through improvements to the design of a training set or monitoring a training set to evaluate its effectiveness. This positive impact spans the programme through routine testing protocols. For example, we use a modified 7 x 200m step test at least once every macrocycle of training to monitor changes in physiological condition of the athlete. This data is also then used to assist the coach in making more objective decisions about their training programme and any changes that they are looking to make through allowing them to see objective information on how effective the training plan is in achieving the desired outcome.

The bigger picture element relies heavily on physiological input to ensure that the training cycle/year is structured well and an optimal taper is in place to peak at the identified competition for that year. With regard any competition on our annual plan, athletes and coaches work to their own taper. Due to the key differences between athletes regardless of them being a Paralympian or not, to run a team taper would be inherently flawed, achieving success with some athletes and not with others. I work on an individual basis with the athlete-coach units on our programme to optimise their own tapers based on the information we have on each athlete. Any proposed changes to a taper would be trialled at a smaller competition to ensure that it had a positive effect and gives the athlete-coach unit confidence in using a 'new' taper before the benchmark meet.

In your opinion, are there any aspects of sport science support that are value more valuable to paralympic athletes than others?
I don't believe that there is one particular area of sport science support that is more valuable to Paralympic athletes. What is important is that the support team around each athlete works in an integrated manner to ensure that solutions to performance-related problems consider all areas relating to that individual, including their disability, before putting a plan into action. Some individuals may rely on different support disciplines to different degrees, but that is the nature of being an individual.

Finally, what advice would you give to physiologists or other sport scientists working with disabled athletes?
Focus on the athlete's ability! It is also critical that we move away from the belief that because we work with disabled athletes, this somehow makes our support drastically different. There are obvious additional considerations that we have with our athletes in terms of their disability but fundamentally, we still work in sport. There is a lot to be learnt from the creative and innovative work being conducted in Paralympic sport as well as learning from those individuals working in Olympic sports. I am not underestimating the importance of researching different disabilities, and the effects this has on ultimate physiological performance. As well as the normal channels of research, asking the athlete about how their disability affects them will always be the best place to start. ■

Box 1. Disability classifications

Classification is the process of grouping disabled athletes into specific categories for the purposes of competition. The purpose of classification is to ensure that disabled athletes compete on a 'level playing field'.

(a) An S1 classification relates to swimmers with a physical impairment, specifically a high dependency in their everyday needs, and will usually be a wheelchair user.

(b) An S10 classification relates to swimmers with a physical impairment, specifically a minimal weakness in legs, restriction of movement in the hip joint, minor limb loss, or part of a limb or the deformation of both feet.

Catherine Gilby

Catherine Gilby has been a BASES accredited sport and exercise scientist working with the GB Paralympic Swimming Team, and is currently working toward BASES High Performance Sport Accreditation for submission in July.

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