Climbing is characterised by both high physical and psychological demands.
Increasing participation levels and competitive interest in climbing has led to a correlative demand for training solutions. Conditioning professionals must now consider more carefully the physical demands of the various forms of the sport, and choose appropriate methods and means for developing the physical condition of the climber.

Climbing is characterised by both high physical and psychological demands: participants must manage the unique puzzle of assessing and choosing the most effective route and technical moves, with potentially high physical force requirements. Dynamic gymnastic-like movements, static isometric holds, explosive strength work, stamina and intense isometric gripping are key.

In numbers: climbing walls in the UK
1988: 40
2003: 254

Physical abilities for climbing performance
The physical demands of climbing can vary significantly depending on the route and grade of difficulty. While a beginner climb may be relatively easy physically, an elite-level climb may place very significant challenges on the physiological systems. Climbing is unusual physiologically in that it requires intermittent and prolonged isometric muscle contractions. As an individual climbs, oxygen consumption and heart rate increase and, with the increased difficulty of the climb, blood lactate levels rise; this indicates that both whole-body aerobic capacity and the anaerobic energy systems may be important to performance. Limited data examining physical abilities exists; it has been suggested that strength, power, endurance, flexibility and stamina are important abilities for climbers to develop. Early work by Grant et al suggested finger and shoulder girdle strength and endurance, along with hip flexibility, should be important training considerations. More recently, a significant review undertaken by Giles et al highlighted high levels of muscular endurance, particularly isometric, increased finger strength, and greater strength and endurance in the arms and shoulders, as potentially beneficial to climbing performance. They further suggested that flexibility related to specific climbing movements (e.g., high stepping or bridging) might also be useful.

Characteristics of elite climbers
There is still little scientific analysis exploring the physiological demands of rock climbing, and much of the current programming is as much based on anecdotes and tradition as conditioning science. A significant review of the anthropometric literature on climbers by Watts indicated the mean height and body mass of male climbers to be around 1m 77cms and 65kg, with body fat percentages measured with callipers at around 6%. In females, these figures were 1m 64cm, 51-52kg and approximately 12%. This data appears to support the general perception that elite climbers have low body-fat levels, low body mass and are small in stature, although there is no evidence yet to suggest reduced body fat leads to improved performance.

Watts’ athlete profile for rock climbing
Small stature/low body mass/body fat
Upper body strength to weight ratio
Muscular and isometric endurance
Upper body power
Moderate aerobic power

Designing a conditioning programme for climbing
Most information on conditioning ideas for climbers comes from either the Internet or climbing magazines. A small number of books have also been produced (e.g., Horst 2008). We must be cautious because, to date, no scientific evidence exists on the impact of different types of training on climbing performance, nor has any work yet identified any hierarchy of importance for the relevant variables. However, from our understanding of the sports training...
process and the physiological analysis so far performed, it is possible to design an approach that may be beneficial.

As outlined in previous articles in this series, in order that the development of the physical abilities of the individual takes place sequentially, the concept of General Physical Preparation (GPP) and Specialised Physical Preparation (SPP) has developed. GPP requires the development of a person’s overall working capacity, with the purpose of increasing capability within all the major biomotor abilities required in all sport (i.e., strength, endurance, agility, flexibility, etc.). The major purpose of SPP is to develop the specific skills and abilities required within the sport of choice (in this case climbing). Training focuses on specific joints and muscles determined by movement analysis, and considers types of muscle action, speeds of movement, specific loading and patterns of movement.7

From a resistance-training perspective, during GPP exercise selection might include lower body movements such as Jefferson or sumo squats, lunges and calf work. Upper body movements to strengthen the shoulder girdle should include rows, pull-downs and overhead pressing, along with some forearm work. A whole-body general flexibility approach would be appropriate here and a range of basic trunk exercises could be used.

In SPP, exercise selection might progress to variations of step-ups, single-leg squats and explosive lunges for the lower body and variations of pull-ups and grip work with finger-strength emphasis for the upper body. Climbing equipment such as fingerboards can be useful. Specific flexibility work – particularly for the hips and shoulders – should be introduced, and integrated movements such as reverse wood chops and landmines might also be good choices in this phase of training. Utilising a climbing wall for specific conditioning sessions might also be a smart move at this stage.

Watts’ recommendations: GPP for rock climbing conditioning
Develop general aerobic power (target a VO2max of 50-60 ml/kg/min)
Develop strength via both hypertrophic and neural adaptation strategies
Develop rhythmic isometric endurance
Increase specific phosphagen system capacity with short intense interval work
Increase lactate tolerance via longer intervals with active recovery
Develop and maintain range of motion using both static and dynamic approaches

Climbing performance is influenced by many variables, with physical ability becoming more important as difficulty increases. This has resulted in a need for conditioning professionals to design training programmes to help climbers improve performance. Although limited scientific literature exists, early work has highlighted potential areas where physical training may be useful. Further work is likely to identify the importance of well-designed physical training interventions in developing climbing ability in all its forms.  

For a list of references and resources, visit www.fitpro.com/fitpro/references

With a focus on performance development and conditioning, Gary Stebbing has 28 years’ experience of sport and performance at the highest levels. In the last 16 years he has accumulated close to 15,000 contact and training hours, helping clients achieve personal success and reach their goals. For more information visit www.garystebbing.com