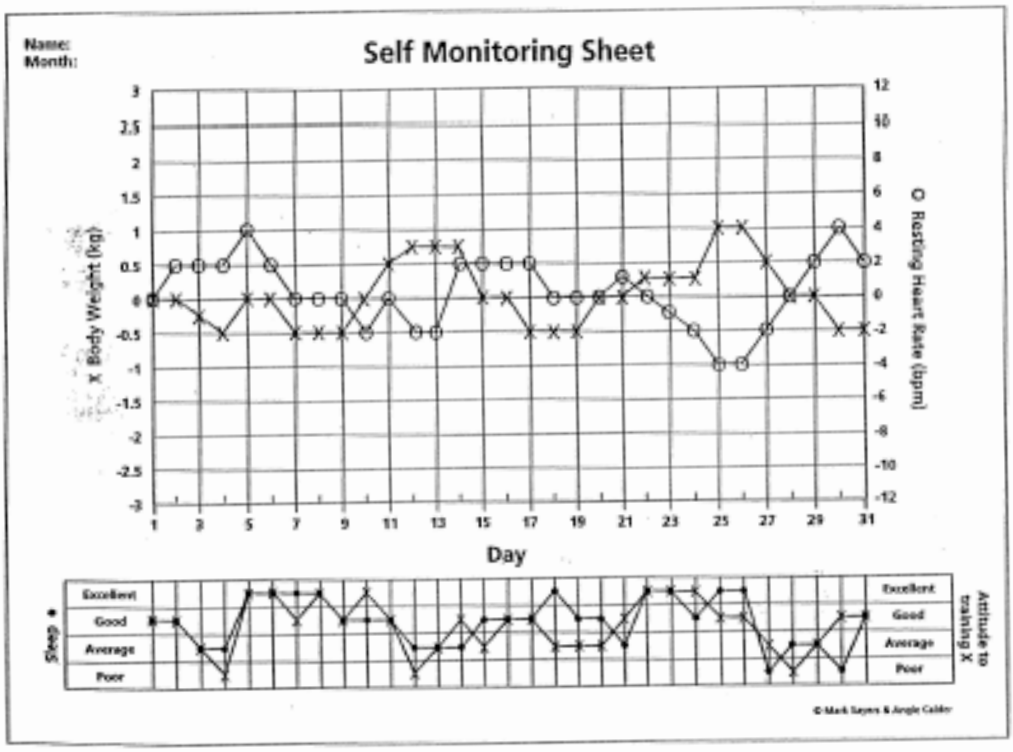
UNIT 12

Recovery Methods

How to Use Your Self-Monitoring Sheet

How to Use Your Self-Monitoring Sheet

- Photocopy the enclosed Master Sheet and use these copies to plot your results daily. Do not write on the original copy.
- Plot your Resting Heart Rate, Body Weight and Sleep Pattern first thing each morning.
- Use a different symbol X • □ △, or a different coloured pen/pencil for each variable.
- Plot from left to right but use the appropriate scale for each variable i.e. **Resting Heart Rate** and **Attitude to Training** read from the right hand axis.
- The days of the month are indicated and synchronised with both graphs.
- Plot your Attitude to Training at the end of each day.

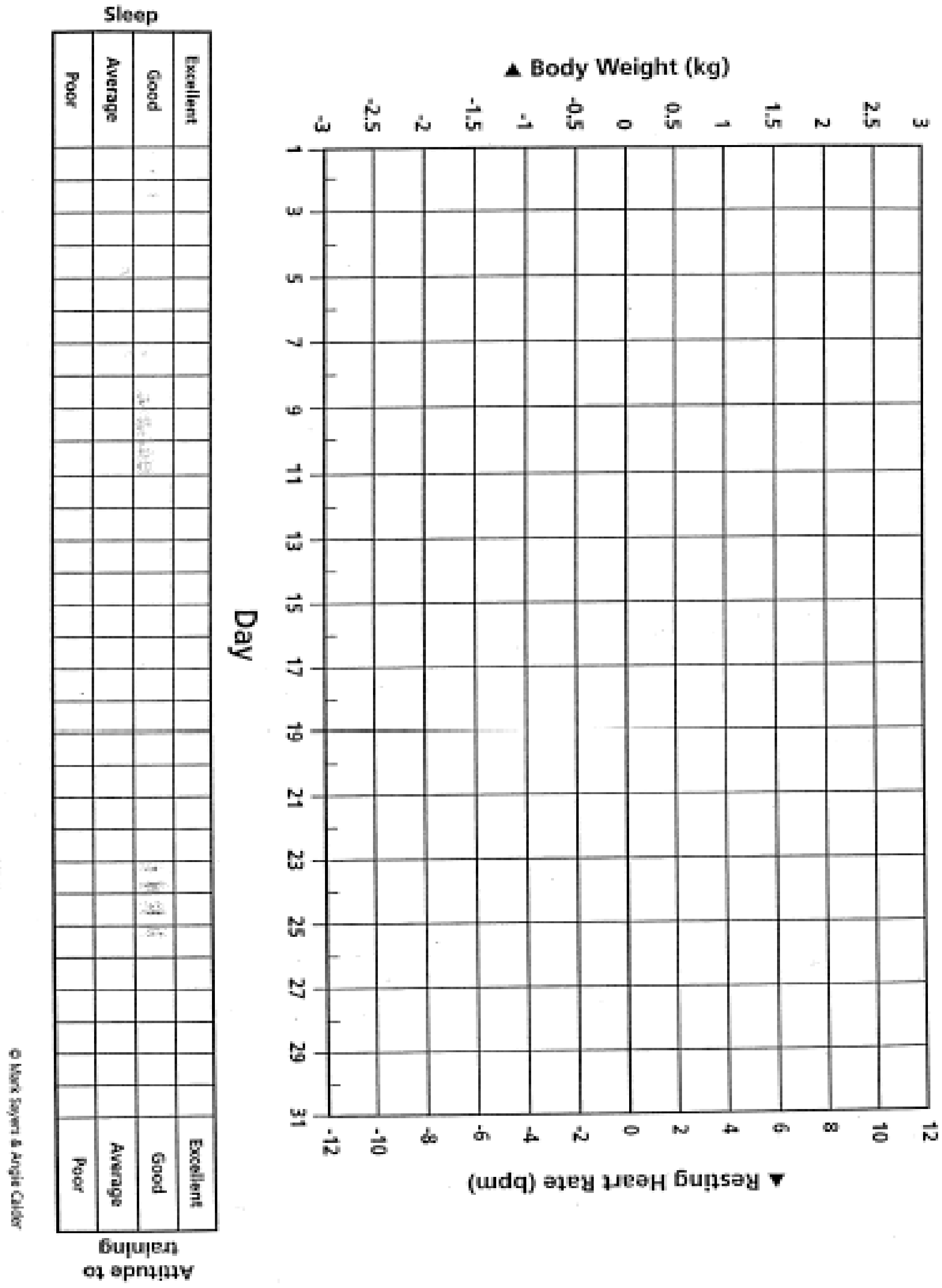


- Keep the Self-Monitoring Record handy — beside your bed.
- Record all 4 variables consistently over a 3–4 month period to identify your normal stress response range.
- Guidelines about each of the 4 variables are on the reverse side of the Master Sheet.
- Monitoring your responses can help identify signs of overtraining or overuse problems = non-adaptive responses.
- Detect potential problems early by **"tuning in to your body".**

Self Monitoring Sheet

Name:

Month:



Use of Hot and Cold Therapy for as a Modality for Recovery

By Leigh Smith

One of the crucial components of modern strength and conditioning are the recovery process planned for the athlete after both training and competition. Tomlins & Wagner (2001) defined recovery as the return of the muscle to its pre-exercise state following exercise. With elite and sub-elite sporting teams striving for every advantage, the capacity to make the most of every training minute is essential. As a result, coaches are forced to search for the recovery techniques to facilitate this.

Figure 1. Effects of an accelerated recovery (Adapted from Calder 2005). *Appendix I*

Contrast therapy is one such technique that has received considerable attention in recent times. Also known as contrast baths and hot/cold baths, it has been more readily associated with the sports medicine and rehabilitation fields for localised injury treatment. Contrast therapy involves the alternating immersion of a limb, lower or whole body into icy and hot water. While there is limited supporting literature behind this technique, there are numerous practical instances advocating its application.

Physiology

When we consider the physiological effects of cooling and heating, we can begin to appreciate why such methods are becoming common practice.

It has been established that cooling (cryotherapy) decreases skin subcutaneous and muscle temperature (Cochrane, 2004, Enwemeka, et al., 2002, Harrison, 2004). It is believed that this reduction in tissue temperature stimulates the cutaneous receptors causing the sympathetic (involuntary) fibre to vasoconstrict. This tightening results in a reduction of swelling and decreased rate of metabolism which in turn lessens "the inflammatory response, vascular permeability and formation of oedema" (Cheung et al., 2003), while also reducing the sensation to pain (Enwemeka, et al., 2002). Pugh et al. (1960 from Cochrane) indicated that when superficial tissue was cooled, the "incoming warm blood is diverted to the deeper tissue.

In contrast, the exposure of the muscles to heat (thermotherapy) has shown to increase tissue temperature, localised blood flow, muscle and skin elasticity and cause vasodilation "increasing oxygen and antibody supply" (Harrison, 2004) leading to an increase in metabolic activity. It also reduces muscle spasm (Cochrane, 2004, Prentice, 1999). Again it is the manipulation of the sympathetic nerve response to the heat that causes the vasodilation and increase in circulation.

Previous research has shown that metabolites are cleared by the blood exchange from superficial to deep tissue (Pugh et al., 1960 from Cochrane, 2004). Hence if the vasoconstriction/dilation cycle is continually shunting blood and its associated metabolic waste to the deeper tissue, it is assumed that this will accelerate the removal of the metabolic waste leading to a quicker and more effective recovery. Kuligowski et al. (1998) found that highly active subjects recorded lower blood lactate concentrations using contrast therapy than passive recovery following treadmill running to exhaustion.

Contradictory research by Myrer et al (1994) found that there was minimal fluctuations in intramuscular temperature, 1 cm below the skin, when participants lower leg was immersed in cold water (15.6 ˚C) for 60 seconds or hot water (40.6 ˚C) for 4 min. Additional research by the same group found similar results when hot and cold packs were used for 5 min each. This research was later contested when Enwemeka et al. (2002) found that when the skin was cooled using ice packs for 20minutes, superficial tissue (1 cm) temperature returned to normal 8 minutes post application, while deeper tissue (2 and 3 cm) continued to cool up to 40 min post application.

A secondary benefit is the perceived neural improvements following cryotherapy and contrast therapy. When differences were investigated between

contrast therapy and passive recovery, Bonham et al. (n.d.) reported significant decreases in heart rate and Rating of Perceived Exertion (RPE) in netball player. The subjects had completed a traditional 20 m shuttle run test (Beep Test), undergone the recovery procedures and then completed a 15 min netball simulation precisely 1 hour post beep test. Kuligowski et al. (1998) found similar increases in perceived recovery, while Viitasalo et al. (1995) proposed that thermotherapy (36-37 ˚C) limited the decline in lower leg power between two plyometric training sessions when compared to passive rest. Calder (2005) suggests this neural stimulation is a result of the central nervous system (brain) receiving and interpreting two different types of information – hot and cold with this rapid change in stimuli increasing the athletes arousal.

Despite the conflicting current scientific research into the validity of contrast therapy, its popularity continues to grow within many elite and sub-elite sporting organisations. Whilst based almost purely on anecdotal evidence, many organisations believe the process to be of "great benefit to (their) players (Spits 2006).

Contrast Therapy Protocols

There are considered to be 4 key variable which need to be established in relation to the protocols utilised with the treatment. Immersion ratios, reps, temperature and time post activity. These variables are presented in table 1 (appendix II), taken from literature presenting positive results from contrast protocols.

Table 1. Review of previous contrast protocols. *Appendix II*

Although the literature, particularly that of the scientific nature, has not yet determined the most effective guidelines for the treatment there has been a general acceptance to those employed by the Australia Institute of Sport (Calder, 2005).

Their recommendation is three minutes in the spa (approx 40 °C) followed by 30-60 seconds in the plunge pool (approx 11 °C) to be repeated three times. As shown in table 1 this procedure was used utilised in both the Bonham et al (n.d.) and Kuligowski et al. (1998) studies, and has been cited in literature by Harrison (2004), Calder (2005) and Cochrane (2004). Spits (2006) added that finishing with 60seconds of cold may leave the athlete with an increased level of arousal. Calder (2005) warned that "there is a tendency for athletes to linger too long in a warm environment and this can offset the benefits of the treatment due to neural fatigue and possibly dehydration.

The one variable that was not addressed adequately in the above investigations was the time treatment began post activity. Coffey et al (2004 from Bonham et al., n.d.) suggested that in their prior study the gap of four hours between activity and treatment was too long to reflect the direct benefits of contrast therapy on blood lactate levels. Following this, Bonham et al. (n.d.) employed an immediate treatment following an active warm-down, producing a decrease in blood lactate levels between contrast therapy and non-contrast therapy groups. This suggests that immediate treatment following active recovery (Jefferys, 2005, Calder, 2005, Spits, 2006) appears to be the most effective in accelerating blood lactate removal.

Methods for Sub-Elite Organisations and Individuals

Spits (2006), Calder (2005), Bonham (n.d.) & Viitasalo et al. (1995) have all strongly supported the therapeutic benefits of spa/whirlpool treatment on large muscles attributable to the massage effect of the jets. While this is an unquestionable additional benefit, the majority of sub-elite sporting organisations and/or individuals are not in a position to accommodate this type of resources.

There are two generally acknowledged alternatives to spa/whirlpool treatments for contrast therapy. They are "Wheelie Bins", and showers:

1. The most commonly utilised means of contrast therapy for sub elite organisations in the "portable wheelie bin (PWB)". The major benefit of the PWB is its portability, allowing for a reproducible recovery routine, regardless of where the activity has taken place. Also, due to the shape of the dimensions of the bin (120L = L 490 x W 550 x H 900), it allow the water level to be adjusted to reach waist height for most athletes, and the

plastic is strong enough to withstand large volumes of water, transportation and general wear and tear.

2. The use of shower for contrast therapy has been highlighted in past literature as an alternative to baths, spas etc. Jefferys (2005) suggests that "contrast showers should be seen as the main tool for hydrotherapy, given their accessibility". The one difference reported between showers and baths is the duration of the heat treatment. Harrison (2004) refers to the English Rugby Union team using 5 hot and 5 cold showers lasting one minute each. Spits (2006) and Calder (2005) suggested 30 seconds cold – 30 seconds hot, repeated 3 times. Similarly Jeffreys (2005) proposes 1 minute hot and 30 seconds of cold alternating 3 times. Although Jefferys (2005) includes "as hot as tolerable" in his guidelines, the one concern of using an alternating hot/cold shower is the potential to raise the temperature to much in the hurried circumstances, possibly increasing the occurrence of scalding and/or burns.

Through personal communications and reviews of literature, it appears that the most accessible and practical protocol to use for sub-elite organisations is a combination of ice baths using "wheelie bins" and hot showers, following the protocols established at the Australian Institute of Sport. The perceived benefits of this protocol include the ease in transportation, the reproducibility and the ability to maintain a constant temperature. A complete hot/cold protocol and post game/activity strategies are summarised in table 2 (appendix III) and table 3 (appendix IV) respectively.

Table 2. Guidelines for contrast therapy. *Appendix III*

Table 3. Guidelines for post game/activity recovery (Adapted from Jefferys, 2005). *Appendix IV*

Recommendation and Contra-Indications to Contrast Therapy.

- Have a large faced analogue clock with a second hand in clear view.
- Place a crate or small plastic box/milk crate in the bottom of the wheelie bin to aid in exiting the bin. The crate should be small enough that the individual can stand comfortably on the bottom of the wheelie bin to still attain full depth.
- Increase fluid consumption while partaking in hydrotherapy (Fluid replenishment should be used as part of any recovery process).
- Athletes should quickly shower to remove any sweat, dirt, foreign matter or bacteria before entering baths.
- Any athletes with open wounds, acute injuries, severe bruising or heat stress must not participate in the contrast therapy. Note- athletes with open wounds can use contrast showers only if applicable.

While there is limited scientific research to confirm the physiological effects of contrast therapies, overwhelming anecdotal testimonials along with personal observations and experience suggests that hot/cold therapies have the capacity to play a major role in the recovery process in the athletic environment. Whether these benefits are physiological, neural, purely a placebo or a combination, their perceived benefits necessitate further research into the functions of the therapy. Two keys areas of future research include the blood lactate levels pre- and post-recovery following actual sports events and the physiological/metabolic differences caused by partaking in hydrotherapy "the day after the match"

With the proper applications of active recovery, stretching, hydrotherapy, appropriate re-hydration and nutritional management, accelerated recovery should follow, allowing a faster and more proficient return to training. It should be expected, if nothing else, contrast therapy offers an excellent team building exercise as the shock, excitement, humour and energy created from the process affects the athletes as a whole as the go through the process together.

References

1. Bonham, S., L. Talbot, M. Gall, Y. Werder, M. Walters and C Peterson. The effect of a contrast hydrotherapy recovery technique on the post one hour performance of netball players. *University of Otago, School of Physiotherapy: Human Performance Centre.* N.d. Accessed online at:

http://www.peakcentreireland.com/docs/research_hotcold.doc:
2. Calder, A. Advanced Coaching Study Pack – Recovery Training. Ausrtalian Sports Commission: Canberra. 2005. Available online at: http://www.trainingsmartonline.com/images/Free_Triathlon_Articles/Triathlon_Training_Recovery.pdf.
3. Calder, A. The science behind recovery: Strategies for athletes. *SportsMed News,* 2(3). 2001.
4. Cheung, K., P.A. Hume, and L. Maxwell. Delayed onset of muscle soreness: Treatment strategies and performance factors. *Sports Med.* 33(2):145-164:2003.
5. Cochrane, D.J. Alternating hot and cold water immersion for athlete recovery: a review. *Physical Therapy in Sport*. 5:26-32. 2004.
6. Enwemeka, C.S., C. Allen, P. Avila, J.Bina, J. Konrade and S. Munns. Soft tissue thermodynamics before, during and after cold pack therapy. *J. Med. Sci. Sports and Ex.* 34(1):45-50. 2002.
7. Harrison, A. Don't pour cold water over hydrotherapy. *Peak Performance.* 205:4-5. 2004.
8. Jefferys, I. A multidirectional approach to enhancing recovery. Strength and Cond. Journal. 27(5)9: 78-85. 2005.
9. Kuligowski L.A., S.M. Lephart, F.P. Giannantonio, and R.O. Effect of Whirlpool Therapy on the Signs and Symptoms of Delayed-Onset Muscle
10. Soreness. *J Athl Train.*;33(3):222-228. 1998.
11. Myrer, J.W., D.O. Draper, and E. Durrant. Contrast therapy and intramuscular temperature in the human leg. *J. Athletic Training.* 29(4):318-322. 1994.
12. Myrer, J.W., G. Measom, E. Durrant and G.W. Fellingham. Cold- and hot-pack contrast therapy: subcutaneous and intramuscular temperature change. *J. Athletic Training.* 32(3):238-241. 1997.
13. Prentice, W.E. Therapeutic Modalities in Sports Medicine. 4th edn. McGraw-Hill : Boston, USA. 1999.
14. Spits, D. Personal Communications. April-May 2006.
15. Tomlins, D.L., and H.A. Wagner. The relationship between aerobic fitness and recovery from high intensity intermittent exercise. *Sports Med*. 34(2):257-261. 2001.
16. Viitasalo, J.T., K. Niemala, R. Kaappola, T. Korjus, M. Levola, H.V. Mononen, H.K. Rusko, and T.E. Takala. Warm underwater water jet massage improves recovery from intense physical exercise. *Eur. J. Appl. Physiol. Occup. Physiol.* 71(5):431-438. 1995.

Appendix I

The effects of an accelerated recovery

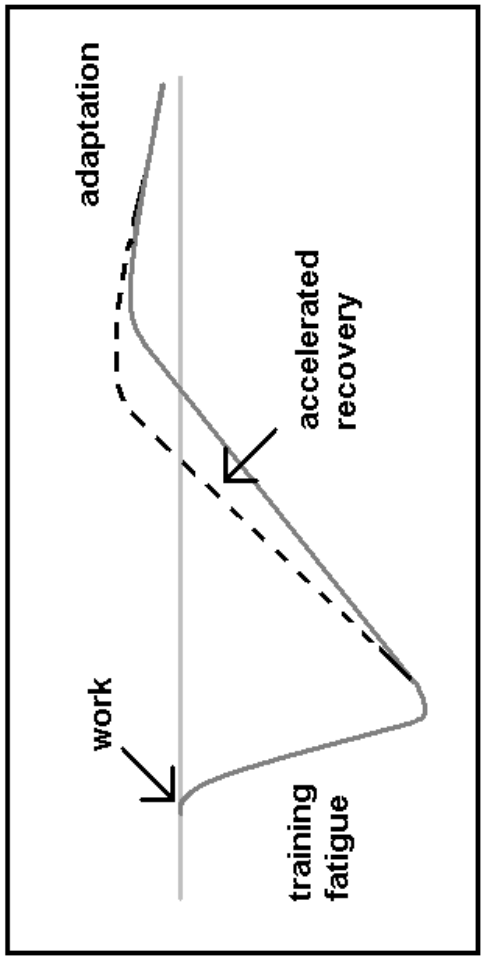


Figure 1. The effects of an accelerated recovery. Adapted from Calder (2005).

Appendix II

Review of previous contrast protocols

Authors	Methods #	Immersion Times#	Temperature#	Reps	Time Post	Result
Bonham (n.d.)	H - Spa C - Tub	H – 3 min C – 30 sec	H - 38-40˚C C - 8-10˚C	3	< 10min - following active recovery	Positive Result
Calder A (2005)	H - Spa C - Tub	H – 3-4 min C – 30-60 sec	H - 39-40˚C C – 10-12˚C	3	< 20min - following active recovery	Protocol Only
Calder, A (2001)	H - Spa C - Tub	H – 3 min C – 30 sec	H - 38-40˚C C - 8-10˚C	3	< 20min - following active recovery	Protocol Only
Calder (1996**)	H - Spa C - Tub	H - 3-4 min C – 30-60 sec	Not Stated			Not Stated
Jeffreys, I (2005)	H - Spa C - Tub	H – 2 min C – 30 sec	Not Stated	3-4	15-20min - following active recovery	Positive Result
Kuligowski et al. (1998)	H - Spa C - Spa	H – 3 min C – 1 min	H - 38.9˚C C – 12.8˚C	6	0H, 24H, 48H & 72H	Positive Results
Myrer (1994)	H - Spa C - Spa	H – 4 min C – 60 sec	H - 40.6˚C C – 15.6°C	4	N/A	No Result
Myrer (1997)	H - Pack C - Pack	H – 5 min C – 5 min	Not Stated	4	N/A	No Result
Spits (2006)	H - Spa C - Tub	H – 3 min C – 30-60 sec	H - Approx 40˚C C - Approx 11˚C	3	< 20min - following active recovery	Positive Result

H = Hot, C = Cold

** From Cochrane (2004)

Appendix III

Guidelines for contrast therapy	
1. Shower - make sure to wash off all dirt etc. (Warm Temp)	**60sec**
2. Ice Bath (8-12˚C)	**30-60sec**
3. Hot Shower (38-41˚C)	**3min**
4. Ice Bath (8-12˚C)	**30-60sec**
5. Hot Shower (38-41˚C)	**3min**
6. Ice Bath (8-12˚C)	**60sec**
Continue to re-hydrate during the treatment	

Table 2. Guidelines for contrast therapy.

Appendix IV

Within fist 5min post
i. Complete active recovery incorporating long slow movements and stretching – 5-10min ii. Begin re-hydration iii. Consume high glycemic index (GI) carbohydrates and proteins (4:1 Ratio)
15-20 min post
i. Complete hydrotherapy as outlined in table 2 ii. Continue to re-hydrate
Within first hour
i. Continue to re-hydrate ii. Consume mixed glycemic index (GI) carbohydrates and proteins

Table 3. Guidelines for post game/activity recovery (Adapted from Jefferys, 2005).

UNIT 13

Special Populations

Strength Training Wheelchair Athletes

By Paul Turk

In my role as the coach of the Victorian Wheel chair Power Lifting team, and many years experience in training wheelchair athletes I have gained valuable experience which will benefit future coaches in this area.

Back ground

The main disability with the wheel chair team is 'Spina Bifidea'. Spina Bifidea comes from the word 'split spine' in Latin. It is one of a class of serious birth defects, called neural tube defects (NTDs), which involve damage to the bony spine and the nervous tissue of the spinal cord. Some Vertebrae of the spine don't close properly during development and the spinal cord's nerves don't develop normally. They are exposed and can be subjected to further damage. At birth, they protrude through the gap instead of growing normally down the bony spinal column.

Nerve signals to most parts of the body located below the level of the 'split spine' are damaged and a wide range of muscles, organs and bodily functions are affected.

With almost 70% of Spina Bifidea cases, they also suffer a condition called ' *Hydrocephalus'* which is a build up of cerebrospinal fluid in the brain. Also another condition common with Spina Bifidea is the *Arnold Chiari malformation,* in which the brain stem physically jams into the spinal cord, both of these abnormalities may cause many brain function disabilities. These conditions are normally controlled by inserting a shunt, (a valve to drain the fluids).

<u>A Summary of the conditions to be aware and taken into account are;</u>

- Reduced sensation & movement in the lower body, legs & feet.
- A degree of paralysis of the lower body and legs
- . Reduced co ordination, and body control
- Learning difficulties
- Abnormal joints
- Deformities of the spine - commonly scoliosis, where the spine bends in a 'S' shape.

With this in mind, a dedicated coach should research the history of each athlete they work with and their individual condition should also be assessed. As well as their personal general assessment, contact other professional's who have worked with that athlete, specialist's Physio's etc, to get a good understanding of *their* personal position and how well they can adapt to weight training.

<u>Wheel chair power lifting,</u>

In Wheelchair sports Power Lifting; is primarily a one (1) maximum bench press with a Free barbell. Each Competitor has three attempts to press the maximum lift they can complete. The Barbell must visibly touch the chest, and then be pushed through full extension at the elbows, locked out and held still, until cleared by all the judges, to be passed.
If the competitor presses the barbell fully, but is lifted unevenly and the bar not held still for long enough, the judges can assess it as a non-lift, therefore for the wheel chair athlete control is of vital importance as much as the actual lift. As they may have the strength to press the weight, but they need to be able to control the weight as well.

PLANNING

With these in mind, as in training all athletes, a periodised plan needs to be put in place, to enable peaking for competition and trials such as state, nationals and international events. We cycle different types of training throughout the year to keep the performance of the athlete improving and to avoid burn out and over training.

When planning for these events and cycling certain types of training, towards peaking for an event, it is important with a disabled athlete to *lengthen each training cycle.* With these types of athletes they have learning difficulties and their learning curve is a lot slower, taking them longer to learn the movements. (Anatomical Adaptation) Only after they have mastered the movement then real strength gains can be made.

We tend to work on 3-week cycles with most athletes; with these athletes I have found 6-week cycles is a better scale to work to. Enabling them to learn and re-enforce the movement technique of each exercise, then increasing the intensity to make strength gains from the exercise programming. Make sure the athlete has fully mastered the movement and has full control on the full range of movement before increasing the intensity (weight) of the exercise.

Also when planning remembers to enable enough time to teach and develop exercises for Balance, co -ordination and abdominal strength. As these athletes have lost some control of their lower body and legs, they have to learn how and what muscles are working that will enable them to stabilize. Even lying flat on a bench press can be challenging at an early stage. This needs to be developed early then continually re-enforced, as with these athletes they will lose the control if it isn't being focused on.

TRAINING SESSION,

Each session we initially work on technique, re-enforcing the correct movement pattern before strength training is under taken. The primary exercise to be focused on is bench press, but as with all athletes a full range of exercises must be included in every training session.

Supporting muscles groups are important. Shoulders, back and arms all need to be trained as well. Also dependant of their personal situation, leg training is beneficial, having them learning that they do have some level of leg strength and co ordination is important. For when they are performing the bench press they are able to control their legs and lower body themselves. Basic exercises like Leg press, and leg extension can generally be performed. If they develop the leg strength and balance it will enable them a stronger lift on their bench press, as they are less worried about controlling their legs and having them falling off the bench and losing control. All focus is on the chest and pressing the barbell.

I believe this was one of the areas that improved the overall performance of the Victorian team, at the last National Championships, in April 2003, where every single member of the Victorian team won gold medals.
Example of a weight-training program

Rep and set range are dependant of what phase the athlete is in of their training, and how far away the next competition is away.

Refer to Page 28 for example program.

WARM UP

An extended warm up is extremely important, with these athletes, as it takes a little longer for the muscles to co ordinate and get the movement right. We tend to start with an aerobic activity, boxing, speedball or hand cycle. Then starting with most important exercises first, Barbell bench press should be performed first. Have a minimum of five (5) warm up sets, starting at 20% 1RM, slowly increasing to75%1RM

TRAINING SESSIONS/ PROGRAMMING

As per all athletes the principle of FITT will be covered. Frequency, Intensity, Type, and Time.

Frequency

With these types of athletes the frequency, should vary depending on the phase of training and how far they are from competition. Initially, training on every 3rd day has provided optimum results, then as we approach closer to competition, training with weights every second day. With Heavy more intense workouts done early in the training week, and technique and lighter workouts later in the training week.

As a final preparation we found lifting 4-5 days in the final week prior to competition beneficial, keeping the technique spot on.

Also lifting the day before a competition is very important, in regards to the "Performance Arousal curve", so we don't lose any of the intensity we've gained through training.

1. Intensity

Early in the training week the sessions should be of high intensity and be performing at heavy end of the lifting scale. Then throughout the week, intensity reduced and weights lighten, reps range increasing. Focusing more on technique.

In the individual training sessions, these athletes get tired fast and lose intensity, energy and strength. At this point they will just go quiet, and seem to 'doze' off, and become less responsive.

That is why each session should not last any longer than 40 minutes. With all quality lifting and training done in the first 20 minutes. The rest period should be a minute to a minute and a half between sets. After the first 20 minutes, reduce the

intensity and enable longer recovery between sets and exercises, with two to two and half minutes rest. The last 20 minutes, you can focus on technique, core/abdominal strength, stretching and flexibility.

TYPE

As the event of wheel chair power lifting is purely, strength based, the training should mainly be weight-training sessions. Although it is beneficial for these athletes to engage in an aerobic session once or twice a week, for their own health and well-being. Aerobic sessions consist of, fast rolling outside on athletics' track. Endurance and aerobic fitness, time and distance are the key components in developing fitness. Otherwise swimming and boxing sessions can be conducted. Again, with warm up and cool down the sessions should last around 40 minutes. Intensities are dependant on the athletes starting fitness level. Normal heart rate intensities can be applied once a base level of fitness is established.

TIME

As stated earlier each session should only last 40 minutes total, with the bulk of the work done in the first 20 minutes.

CONCLUSION

Wheel chair athletes provide an exciting challenge for strength coaches. These athletes love the joy of competing and challenging themselves in training. They are very dedicated and determined athletes. They do need some specific coaching, but can produce outstanding results. A quick summary of points to consider are;-

- Increase learning curves, and phase
- Longer training cycles
- Repetitive programming, re enforcing movement technique
- Longer warm up, re training muscles the movement
- Shorter workout time, easy fatigued

Keeping these points in mind, training a wheelchair athlete can be very rewarding. And a great challenge. These athletes love having a go. Be brave, try things, make mistakes, they will fall, out of chairs, etc, they are fine to brush themselves off and keep going, don't put them in cotton balls, keep these points in mind but train them hard.

References:
Betterhealth.voc.gov.au

Victorian **Wheelchair** athlete, Jayne Baxter **Wheel chair sports** Vic,
Rob Cotter. 9473-0133

BRIEF ABSTRACT

The main purpose of this article was to share some of my experiences and knowledge with other coaches. Giving coaches some basic guidelines on training wheel chair athletes for power lifting. As well as general weight training responses for all sport games for wheel chair athletes.

***ABOUT** THE AURTHOR,*

Paul Turk has been a level one strength and conditioning coach for the past 5 years, and is just completing his level two. In this time he has trained many state and national athletes and body builders. He is also a Certificate 4 personal trainer. Paul owns and operates the highly successful personal training company PT's Personal Training in Melbourne. Other experience Paul has includes;

- Strength and conditioning coach at VFL football club Port Melbourne, aligned with North Melbourne Kangaroo's
- State coach of wheel chair power lifting team for past 4 years Winner of Victoria government award ' Inclusion awards' 2003
- Strength/ weights room adviser 1996 Atlanta Olympics. Under Georgia Tech's Head strength and conditioning coach Geoff Mathis.
- Work experience University of Florida, strength & conditioning head coach. Rob Glass

Exercise	Sets	Intensity	Reps*
BarBell Bench Press	5 warm up, 4 training	80% 1RM	4-6
Dumbell Flat Press	2-3		4-6
Cable Row	2-3		4-6
Lat Pulldown to front	2-3		4-6
Leg Press	2-3		6-8
Dumbell Shoulder Press	2-3		4-6
Abdominal floor exercises	4-5		8-12

Exercise and The Elderly – Cardiovascular, Strength and Postural Stability: A Review of the Literature

By Tim Van Dalen, Level 3 Strength and Conditioning Coach

INTRODUCTION

The 2003 Australian Masters Games commenced in Canberra on the 1st of November 2003; The Games accommodated thousands of competitors from all over Australia and is testimony to the adage of *physical activity for a lifetime.* In response to these games, many commercial training providers offered services to prepare these athletes for the games. It is timely to review the older adult and review service provision and exercise recommendations for this growing segment of the Australian population.

Cardiovascular Function.

Maximal oxygen consumption, which is an index of maximal cardiovascular function, decreases by between 5 and 15% per decade after the age of 25 years (13), this is due primarily to reductions in maximal cardiac output. (A function of maximal heart rate and stroke volume).

Maximal Heart Rate (MHR) decreases by 6-10 bpm per decade (220 - age = MHR.) and is centrally responsible for the age related decreases in maximal cardiac output. (8).

Blood pressure and systemic vascular resistance are also higher during maximal exercise in older versus young adults (8)

The cardiovascular responses of older adults to sub maximal exercise are qualitatively and, in most cases, quantitatively similar to those of young adults (8)

Endurance exercise training and the cardio vascular system.

It is clear that older adults can achieve the same 10-30% increases in $V0_2$ Max with prolonged endurance exercise training, as their younger counterparts (11). As with young adults, the extent of improvements in $V0_2$ Max is a function of training intensity; with light intensity training causing minimal adaptation (11),

Further evidence indicates that maintaining high levels of endurance exercise training results in a diminished rate of loss of $V0_2$ Max in older adults. One study reported a reduced rate of loss expressed as a percentage of initial $V0_2$ Max (16). However, the rate of $V0_2$ Max decline for endurance trained athletes over age 70 appears to be similar to that for sedentary adults, presumably as a result of inability to maintain training stimuli consistent with their earlier levels of training. (23)

Effect of endurance exercise training on cardio vascular disease risk factors.

Most cardiovascular ill health symptoms are much more prevalent in older adults. In addition, many other lifestyle conditions', such as type II diabetes and obesity are associated with increasing age, which can substantially impact an adult's cardiovascular response to exercise.

Cross-sectional and intervention studies in older adults consistently indicate that endurance exercise training is associated with improved glucose tolerance (if initially impaired) and insulin sensitivity, these changes are evident prior to changes in body composition (7).

Endurance exercise training appears to lower blood pressure to the same degree in both young and older hypertensive adults (10). One study established that endurance exercise at 50% $V0_2$ Max (65% MHR) elicited the same and often higher reductions in resting blood pressure when compared to endurance exercise at 70% $V0_2$ Max (70-75% MHR) (11).

Body composition is improved with endurance exercise training for both younger and older adults. The most consistent finding is a 1-4% reduction in overall body fat levels, even if body weight is maintained (11). In addition to this, one study indicated that intraabdominal fat decreased by 25% in older men who lost 2.5kg of body weight with endurance exercise training. This is particularly of note considering the well-documented link between intraabdominal fat and cardiovascular disease risk factors in male adults (25)

Endurance exercise training and the cardio vascular system in older adults with cardio vascular ill health.

Older adults with

cardiovascular disease appear to obtain the same beneficial cardiovascular adaptations with exercise training when compared to younger adults with cardiovascular disease, including decreases in heart rate both at rest and during sub maximal exercise (18).

Recommendations for the Strength and Conditioning Coach

The practical application for the Strength and Conditioning Coach is to understand that increasing age correlates with diminished cardiovascular capacities (due primarily to reductions in maximal heart rate response and subsequent cardiac output), irrespective of training history (which only serves to slow the rate of decline), for this reason training volume, duration and intensity will have to be proportionally lower than their younger activity matched peers.

However increasing age does
not correlate with a decrease of trainability of the cardiovascular system;
increases in $V0_2$ max can be achieved with moderate to high intensity endurance training (70-90% $V0_2$ Max or 70-95% MHR). The contra indicators to high intensity endurance training are the same for any segment of the population but it is always wise to obtain medical clearance prior to undergoing such activities (considering the older adult will experience higher blood pressure responses to this level of intensity and may have a higher incidence of relevant cardiovascular pathologies). This has to be understood both by the Strength and Conditioning Coach and the older adult if the outcome of any training regime is to promote endurance orientated performance.

The main challenge to the Strength and Conditioning Coach may well be to counsel
the older adult, as training intensities of 70-90% $V0_2$ (70-
95% MHR) Max may be at conflict with any exercise advice that has been prescribed by the medical fraternity. This is because health orientated
recommendations focus on low to moderate intensity training which has been shown to elicit the same if not greater health orientated benefits than higher intensity training. Furthermore low to moderate level training is often prescribed because of an increased likelihood to promote exercise adherence.

One of the first priority's of exercise prescription will be to establish the particular focus of the program; health versus performance.
In the later example; programming for performance (moderate to higher levels of training intensity) may be precluded by health factors, such as lifestyle conditions that are often implicated with the older age groups, including obesity, hypertension and type II diabetes. In this instance low to moderate intensity training with appropriate medical clearance is recommended.
Additionally, with an increased prevalence of cardio vascular pathologies there is a decreased cardiovascular response to exercise. This means that heart rate response may not be truly indicative of exercise intensity. It is recommended that heart rate response be monitored throughout activity in conjunction with the use of an appropriate Perceived Rate of Exertion scale for subjective monitoring.

Strength Training.

Sarcopenia (loss of muscle mass) occurs with age. The excretion of creatinine, muscle creatine content and total muscle mass, decreases by approximately 50% between the ages of 20 and 90 years (26). Computed tomography of the knee extensors indicates that after 30 years, there is a decrease in cross sectional area, a decrease in muscle density and an increase of intramuscular fat, with these changes been more evident in women (15

A reduction of force generation (muscular strength) is a part of 'normal' aging. It has been reported that isometric and dynamic strength of the knee extensors increases up to the age of 30 years and then decreases after the age of 50 years with an approximate reduction in muscle strength of 30% generally found between the ages of 50 and 70 years (17)
Strength and Functional Capacity.
A significant correlation between muscle strength and preferred walking speed has been reported by elderly adults (3).

In older, frail women, leg power was highly correlated with walking speed,
accounting for up to 86% of the variance in walking speed. For this reason, leg power (dynamic measurement of muscle function) can be used as a useful predictor of functional capacity (4), this has obvious correlations with athletic functionality and mobility with advancing age.

Protein needs and ageing.

The compensatory response to long-term decreases in dietary protein intake is a reduction in Lean Body

Mass. On the basis of contemporary research, the recommended protein intake for older men and women should be between 1.0 - 1.25 g/kg of body weight/ per day of high quality protein (5). in a study conducted by Hartz, S.C. (12), found that approximately 50% of 946 healthy free-living men and women above the age of 60 years consumed less than this amount and less than 25%, in this study, were found to consume less than 0.86g (men) and 0.81 g (women).

Energy Metabolism.

Daily energy expenditure declines progressively throughout adult life (21). Lean Body Mass has been reported to be reduced by an average of 15% between the third and eight decade, this contributes to a lower metabolic rate (6). As a result, fat mass can increase due to a diminished metabolic rate and often associated declines in activity levels without a subsequent reduction in kilojoule intake. (24).

The preservation of Lean Body Mass and the prevention of scarcopenia can aid in the prevention of the decline in metabolic rate. (24).

Resistance Training.

A number of studies have indicated that given an adequate training stimulus, older men and women will experience similar or greater strength gains compared with young individuals as a result of resistance training (9).

Significant increases in metabolic rate with resistance training have been associated with significant increase in energy intake required to maintain body weight in older adults (5)

The effects of a heavy resistance training program on bone mineral density has been displayed in recent studies, these increases in bone mineral density can offset the typical age-associated declines in bone health experienced by the older populations (22)

Recommendations for the Strength and Conditioning Coach.

As a Strength and Conditioning coach it must be understood that increasing age correlates with sarcopenia and a decreased capacity for force generation. Resistance Training has to incorporated into any programming that is focused on athletic performance, as well as for improvements in general health and well-being.

The positive effects on athletic performance that strength and power training can provide for the older adult are a reduction in fat mass via increased needs for energy expenditure and by increasing the basal metabolic rate. Increases in muscular power have also been correlated with increases in functional mobility in all modes of movement.
Progressive strength training improves nitrogen balance, which greatly improves nitrogen retention at all intakes of protein, and for those on intakes below the recommendations, this will offset the loss of body protein stores (muscle).

Further benefits of strength training include providing the stimulus for Minimal Essential Strain (MES), which is required for the formation of new bone tissue and for the retention of bone mineral density, this is of particular importance as nutritional and pharmacological treatment modalities, focused on bone mineral density, generally only slow the rate of loss.

Additionally with increased muscular strength and power, it can be assumed that the older adult will exhibit an increased tendency for spontaneous activity that is brought upon by increased mobility.

The benefits of strength and resistance training for the older adult are the same as for their younger counter parts and age should not be a contra indicator for undertaking such programs. However, it is wise to seek medical clearance prior to undertaking this form of training as the usual contra indicators, which may be pronounced in the older generations, still apply, for example hypertension (which involves prevention of overhead movements and the discouragement of the Valsalva manoeuvre).

The American College of Sports Medicine (ACSM) has released specific recommended variables for resistance training and the older adult (2). These recommendations include; the frequency of resistance training should be between 2 - 4 days per week to generate strength improvement.
Sessions should last for between 20 - 45 minutes in duration, as longer duration sessions have often been implicated in increased risk of injury potential due to fatigue (in particular neural fatigue). Multi joint exercises and machine weights are recommended, however the

older adult is also encouraged to engage in free weight training once a certain degree of skill mastery has been achieved. The older adult should focus attention to the major muscle groups of the body including: chest, shoulders, arms, back, abdomen and legs. Sessions should involve 1-2 exercises per muscle group. For example, if the focus of a resistance training session was the chest, shoulder and arm groups, then the older adult should engage in 1 - 2 exercises per group, this is an exercise range of between 3 -6 exercises per session. The novice older adult is encouraged to undertake 1-3 sets per exercise and then progress to three or more sets as a form of progressive overload. Two to three minutes rest between sets should be adhered to and the older adult is encouraged to undertake 10-15 repetitions per exercise (65-75% 1RM). Progression and progressive overload should not be precluded.

POSTURAL STABILITY AND FLEXIBILITY.

Although difficult to quantify, postural stability, as applied to the older adult simply means a decreased likelihood for losing balance and 'falling over' during a movement activity.

Postural stability generally declines with age due to decline in function of sensory and motor systems (1) and as a result, systems responsible for postural control are receiving inaccurate corrective data. This is also compounded by the muscular effectors, which may be experiencing a diminished capacity to respond to such demands (1).

In a recent study by (20), it was established that participation in light intensity programs significantly reduced the number of falls compared with randomly assigned control groups.
It has further been established that training on tasks specifically targeted at the sensory systems (for example proprioception) involved in the maintenance of postural stability also resulted in improved stability in the older populations (14).
Following a program of walking, flexibility and strength exercises, improvements in strength, reaction time and body sway on both firm and soft surfaces has also been shown (19).

Recommendations for the Strength and Conditioning Coach.

It must be considered that this paper is addressing the effects of exercise and exercise participation in postural stability, however it does not take into account mental dysfunction, postural hypertension, medications, environmental hazards, vision and lower extremity dysfunction.

It also must be accepted that ongoing research is required to distinguish between the types, modes, frequency's, intensity' s and duration's of exercise prescription to establish a recommended training protocol which will
directly improve postural control and stability in the older population.

However there is conclusive evidence, which illustrates a strong correlation between exercise, particularly when the form of exercise addresses the sensory systems of the body,
and improvements in postural
stability. The Strength and Conditioning coach must accept that program prescription should involve special conditioning exercises, which involves a high degree of neural activity. For example stabilising the body on an uncertain surface (standing on one leg on a mini tramp). From a performance standpoint improvements in postural control will obviously correspond to improvements in efficiency of movement as less energy is lost on maintaining posture and motor patterns become more efficient to in act the movements required of the athletes chosen sport.

Additionally, as a Strength and Conditioning Coach, it is wise to have organised support in place for the older populations. Exercise prescription that does involve a high degree of neural activity, will lead to neurological fatigue. It is unwise to undertake a conditioning program, aimed at the sensory systems and inducing neurological fatigue and then leaving your athlete/client to their own devices to find their way home.

Summary

In respect to exercise participation and physical activity for a lifetime, age should not be a limiting factor. Research has illustrated that the physical, social and emotional benefits of exercise are achievable for all ages. All people should be encouraged to be active, in some form or another, to achieve and maintain optimal health status. Exercise professional's should take all due care in their prescriptions, however special consideration will need to be given to the older adult. This special consideration includes an understanding and

accommodation of diminished capacity due to age and in particular: cardio vascular deterioration, sarcopenia and functional neural decline. The exercise professional should also screen for all potential lifestyle associated conditions such as high blood pressure and type II diabetes. In any event a medical clearance is strongly recommended.

During activity, the exercise professional is encouraged to utilise a variety of monitoring devices such as heart rate response and rate of perceived exertion (as impairment of the sympathetic nervous system may 'blunt' cardiovascular response). Activities that require a higher degree of coordination should be discouraged until the older adult has achieved a suitable degree of mastery.

The exercise professional should not have any preconceived opinions on ability and inability's until confirmed via an appropriate medical professional

BIBLIOGRAPHY

1. American College of Sports Medicine. Medicine and Science in Sports & Exercise. Volume 30, No 6. Position Stand. Exercise and Physical Activity for Older Adults. June 1998.
2. American College of Sports Medicine. Current Comment. Resistance Training and the Older Adult. April 2001.
3. Bassey, E. J., M. J. Bendall, and M. PEARSON. Muscle strength in the triceps surae and objectively measured customary walking activity in men and women over 65 years of age. *Clin. Sci.* 74:85-89, 1988.
4. Bassey, E. J., M. A. Fiatarone, E. F. O'Neill, M. Kelly, W. J. Evans, and L. A. LIPSITZ. Leg extensor power and functional performance in very old men and women. *Clin. Sci.* 82:321-327,1992.
5. Campbell, W. W., M. C. Crim, G. E. Dallal, V. R. Young, and W. J. EVANS. Increased protein requirements in the elderly: new data and retrospective reassessments. *Am. J. Clin. Nutr.* 60:167-175, 1994.
6. Cohn, S. H., D. Vartsky, S. Yasumura, A. Savitsky, I. Zanzi, A. Vaswani, and K. J. ELLIS. Compartmental body composition based on total-body potassium and calcium. *Am. J. Physiol.* 239.E524-E530, 1980.
7. Cononie, C, A. Goldberg, E. Rogus, and J. HAGBERG. Seven consecutive days of exercise lowers plasma
insulin responses to an oral glucose challenge in sedentary 60-80 yr olds. J. *Am. Geriatr. Soc.* 42:394-398, 1994.
8. Fleg, J., F. O'Connor, G. Gerstenblith, L. Becker, J. Clulow, S. Schulman, and E. LAKATTA. Impact of age on the cardiovascular response to dynamic upright exercise in healthy men and women. *J. Appl. Physiol.* 78:890-900,1995.
9. Frontera, W. R., C. N. Meredith, K. P. O'Reilly, and W. J. EVANS. Strength training and determinants of $V0_{2ma}x$ in older men. *J. Appl. Physiol.* 68:329-333,1990.
10. Hagberg, J., S. Blair, A Ehsani, N. Gordon, N. Kaplan, C. Tipton, and E. ZAMBRASKI. Position stand: physical activity, physical fitness, and hypertension. *Med. Sci. Sports Exerc.* 25:i-x, 1993.
11. Hagberg, J., S. Montain, W.Martin, and A EHSANI. Effect of exercise training on 60 to 69 year old persons with essential hypertension. *Am. J. Cardiol.* 64:348-353,1989.
12. Hartz, S. C. *Nutrition in the Elderly: The Boston Nutritional Status Survey,* S. C. Hartz, R. M. Russell, and I. H. Rosenberg (Eds.). London: Smith-Gordon, 1992, pp. 1-287.
13. Heath, G., J. Hagberg, A. Ehsani, and J. HOLLOSZY. A physiological comparison of young and older endurance athletes. *J. Appl. Physiol.* 51:634-640, 1981.
14. Hu, M-H. and M. H. WOOLLACOTT. Multisensory training of standing balance in older adults: l-postural stability and one-leg stance balance. *J. Gerontol.* 49:M52-M61,1994.
15. Imamura, K., H. Ashida, T. Ishikawa, and M. FUJII. Human major psoas muscle and sacrospinalis muscle in relation to age: a study by computed tomography. *J. Gerontol.* 38:678-681,1983.
16. Kasch, F., J. Boyer, S. Van Camp, L. Verity, and J. P. WALLACE. Effect of exercise on cardiovascular ageing. *Age Ageing* 22:5-10,1993.
17. Larsson, L. G., G. Grimby, and J. KARLSSON. Muscle strength and speed of movement in relation to age and muscle morphology. *J. Appl. Physiol.* 46:451-456, 1979.
18. Lavie, C, R. Milani, and A. LITTMAN. Benefits of cardiac rehabilitation and exercise training in secondary coronary prevention in the elderly. *J. Am. Coll. Cardiol.* 22:678-683, 1993.
19. Lord, S. R. and S. CASTELL Physical activity program for older persons: effect on balance, strength, neuromuscular control, and reaction time. Arch. Physiol. Med. Rehabil. 75:648-652, 1994.
20. MacRae, P. G., M. E. Feltner, and S. REINSCH. A 1-year exercise program for

older women: effects on falls, injuries, and physical performance. *J. Aging Phys. Act. 2:127-142, 1994.*
21. McGandy, R. B., C. H. Barrows, A. Spanias, A. Meredith, J. L Stone, and A H. NORRIS. Nutrient intake and energy expenditure in men of different ages. *J. Gerontol.* 21:581-587,1966.
22. Nelson, M. E., M. A. Fiatarone, C. M. Morganti, I. Trice, R. A. Greenberg, and W. J. EVANS. Effects of high-intensity strength training on multiple risk factors for osteoporotic fractures. *JAMA* 272:1909-1914, 1994.
23. Pollock, M., L. Mengelkoch, J. Graves, D. Lowenthal, M. Limacher, C. Foster, and J. WILMORE. Twenty-year follow-up of aerobic power and body composition of older track athletes. *J. Appl. Physiol.* 82:1508-1516, 1997.
24. Roberts, S. B., V. R. Young, P. Fuss, M. B. Heyman, M. A. Fiatarone, G. E. Dallal, J. Cortiella, and W. J. EVANS. What are the dietary energy needs of adults? *Int. J. Obes.* 16:969-976, 1992.
25. Schwartz, R., W. Shuman, V. Larson, K. Cain, G. Fellingham, J. Beard, S. Kahn, J. Stratton, M. Cerqueira, and I. ABRASS. The effect of intensive endurance exercise training on body fat distribution in young and older men. *Metabolism* 40:545-551,1991.
26. Tzankoff, S. P. and A. H. NORRIS. Longitudinal changes in basal metabolic rate in man. *J. Appl. Physiol.* 33:536-539,1978.

Educating Junior – Assertive Training and the Pre-Pubescent Athlete

By Chris Fuller, Turramurra, NSW

The curiosity, inventiveness and spontaneous energy of children are sources from which a lifetime of learning can develop. A training program for children should therefore offer experiences designed to enhance these qualities. The child must have a sense of accomplishment, a feeling of confidence. Training can be a great experience for the young athlete who motivated by enthusiasm, is reinforced with positive feedback As that great observer of human behavior Charles Dickens once said: "confidence is a great thing". Physical and mental health are two essential ingredients in the confidence equation. The learning potential of the young athlete *is* enormous if the environment is a positive one. One way of establishing a positive environment is a positive one. One way of establishing a positive environment is to introduce the concept of assertive training, one facet of which is strength or resistance training. The goals of assertive training include promotion of children's sense of security and self-respect; there are perhaps no more important pie-requisites to learning, happiness and mental health. Young athletes are taught assertion so that they may learn to contribute and to realise that they have *rights* that are to be respected The early education of the athlete includes devoting considerable attention to the child's physical well being and development We can learn a lot from failure, most senior Australian athletes would reach a level of development strikingly different from that which they bring to competition if they had been nurtured in assertive training at an early age. It is the purpose of this paper to underline benefits that can be gained by capitalising on our failures, in short to clear up some of the misconceptions associated with assertive training, in particular strength training with the young athlete.

Strength training has been one of the most misunderstood concepts in athletics, the claim till very recently was that weight resistance training designed to develop muscular strength were thought to render the user "muscle bound", and "inflexible". Strength training in females was frowned upon and strength training for children was a taboo subject. There is now no question that resistance training can benefit individuals of any sex and any age provided commonsense is used to undertake the training under qualified supervision and in a safe environment.

It is noted that strength or resistance training does not exclusively mean weight training but can include body weight exercises, the use of apparatus such as medicine balls and partner resistance exercises. The basic principles involved overload and progressive resistance with strict attention paid to the specificity of its effect It is imperative that adequate care is taken not to overload the joints and that the spine is not subject to undue stress.

The most widespread myth about the ill effects of resistance training on children is that this form of training stunts the growth of children. Physiologically speaking, children are not just small adults; for example muscle hypertrophy is not a consideration because androgen testosterone is not present to help stimulate increases. There are significant differences in the biomechanical properties of mature and immature skeletons. Children's bones are in a dynamic state of constant growth and remodeling, while adult's bones change in a much slower fashion in response to the stress placed upon them. The epiphysis for example in children is a biomechanically weak area. A sudden force of chronic excessive stress that causes a sprain in an adult will often cause an epiphysis fracture in a young child. This is not

to suggest that children will be exposed to epiphysis fractures while undergoing resistance training, on the contrary significant strength can be achieved in the muscles, tendons, bones and cartilage's through neuromuscular adaptation. Resistance training if undertaken correctly at an early age will build the foundations of strength that is necessary for the developing athlete, and will eventually lead to significant increases in muscular body weight and bone density. Exercise tends to increase the rate at which height and muscular growth are attained for both pre-pubescent males and females.

Parents and coaches have been relying on hearsay evidence when the issue of injuries to children is discussed. There is no evidence to suggest that well designed resistance training programs produces sufficient stress upon bones to bring about deleterious effects. There is, for example, no data to substantiate claims that effective strength training causes growth plate injuries in children. It must be remembered that most dynamic sports have potential for acute or chronic musculoskeletal injury. The key point for resistance training is correct exercise performance, that is proper form must always be followed. Further, the young athlete should employ relatively light loads and avoid near maximal lifts, especially those involving the lower back such as squats and deadlifts. To this end proper coaching and supervision is a must Exercise must progress in a pain free fashion, attention must be given to both the concentric and eccentric stage of an exercise as most muscle relates injuries occur during eccentric contractions.

Recent studies have demonstrated that strength training does increase muscle strength in prepubescent In a study undertake by L & S Dvorkin in 1987 the training effects on weight-trained Russian children were monitored over a period of fifteen years. The results showed significant increases in muscular body-weight and bone density not experienced in their non-weight lifting peers. The emphasis in training is placed primarily on trunk development for proper back stability later in the athlete's career. The young athlete is inducted slowly so that the major muscles become accustomed to training. The major emphasis is to begin the education of the child into the benefits that strength training can offer to the athlete. The benefits such as an increase in the overall fitness and strength of the ath lete will hopefully motivate him or her to continue. The athlete begin by using very light weight so form is not compromised. An unloaded or broomstick is ideal to begin with. The full movement of the exercise is taught; short jerky movements are eliminated. Concentration is an important by-product of training as the athlete learns to concentrate and block out every distraction and thought not directly related to muscle movement A strong foundation of strength training *is* imperative for development in the young athlete. Prevention of injuries in the future could also be minimalised by the development of strong conditioning habits. Certainly the development of strong conditioning habits would make the progression of the young athlete a lot smoother. The earlier basic movements can be taught the easier *it* will be for the athlete and coach in later years. Correct breathing and lifting techniques will minimise injuries. A good workout schedule for beginners is a three day week program, this will give the young body time to recuperate while at the same time teach the importance of
training regularly. Alternate muscles are worked in a rotation system to obtain maximum recovery, concentrating on primary exercises such as bench presses, pullovers and squats. Training should preferably be done outdoors, or in a gymnasium with plenty of natural light and fresh air. This is important so the athlete is not alienated or made feel uncomfortable. Circuit training on an oval is an ideal method to introduce the athlete to strength training and at the same time keep the fun element of training present. Intensity and volume are concepts that are gradually introduced as the athlete advances in years. The education of the athlete .in total fitness, including aerobics, flexibility, relaxation and strength training will not only develop the athlete physically but mentally as he becomes more aware of the power he has over his body functions. The child through positive reinforcement will have learnt the practical benefits of assertive training both physically and mentally.

Introduction to Training Athletes with Disabilities: "Give it a Go"

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Background

Physical activity and especially sport for people with disabilities involved initially to meet rehabilitation needs. Often it is an initial contact with a physiotherapist that provides a beginning for involvement in physical activity and/or sport. Sport has developed over a period of almost fifty years from competitions involving only sixteen athletes to international events involving over three thousand athletes.

People with disabilities have available to them a wide range of recreational and sporting activities. Many aspects of health have been shown to be improved as a result of these activities. Disabilities encompass many areas. They include for example paraplegic, quadriplegic, cerebral palsy, visual and auditory impaired, transplantee, amputee and intellectually impaired. Any event available to able-bodied can be adapted to most groups with disabilities for example goal ball for visually impaired and wheelchair basketball. The primary reason for implementing an exercise program for an individual with a disability is to provide them with the opportunity to lead a normal active lifestyle in recreational or competitive sports. Possibly the biggest obstacle to overcome in convincing people with disabilities to undertake or continue to participate in physical activity or sport is that of motivation. Results of participation often take much longer to realise in the disabled population. It is worthy to note that the I opportunity for people with disabilities to compete in regular sport is continually being improved. A number of sports are continually becoming more active in promoting opportunities for people with disabilities. They include swimming, netball, athletics, gymnastics and many more.

Goodman (1993) states that the benefits of participation are the same as for any able-bodied person. The main reasons for participation are to improve fitness, develop new skills, increase social contacts, personal enjoyment and challenge, thrill of competition and the chance to achieve and gain recognition within their chosen sport. Goodman (1993) continues that traditionally there has not been the opportunity to participate in sport due to lack of support whether it be for example personal, financial, transportation, discriminatory attitudes or lack of expertise among coaches or officials.

Sport for athletes has developed through the following avenues as listed by Goodman (1993). They are a regular sports structure, the paralympics movement, deaf sports movement, special Olympics movement and transplantee sports movement.

The Australian Sports Commission have developed a video called 'Give It A Go' which encourages coaches to:

- recognise similarities between coaching athletes with disabilities and their able-bodied piers.

- understand it requires sports specific knowledge to succeed
- understand that generally the same principles apply for disabled and able-bodied and to 'give it a go' in coaching an athlete with a disability.

Achievements in sporting activities according to Goodman (1993) can enhance the self-confidence and self-esteem of all athletes. Accomplishments and positive attitudes on the sporting field transpose into the daily life of athletes. This positive attitude as reported by Haas et al (1987) is reflected in the fact that athletes with asthma have won medals in Olympic events including those requiring high ventilatory effort. Even though the level of disability may influence

performance time spent in practice, previous training in sport and age also influence performance in sport. Brasile (1990) states further that athletes in wheelchairs compete with positivity when judged on their ability rather than their disability.

General Guidelines for Coaches

Goodman (1993) provides the most succinct set of guidelines and recommendations and as a result they have been listed in brief in this section. They contain suggestions incorporated from the literature researched for this paper so very little has been changed. Goodman (1993) emphasises that it is important to remember to assess individual strengths and weaknesses, *sot* challenging and realistic goals, communicate clearly and provide positive feedback.

The following guidelines listed apply to coaching all athletes but are especially relevant to athletes with disabilities

- treat as athletes first
- focus on what they can do rather than what they cannot do
- be adaptive and creative
- use the athlete as your greatest resource
- develop an understanding of other factors contributing to the athlete's lifestyle
- find out the athlete's objectives and set challenging but realistic goals
- use simple, clean, clear and concise language and instructions
- encourage joint decisions
- provide accurate and reliable feedback
- encourage the athlete to meet the requirements of the sport to the best of their ability
- give appropriate reinforcement
- expect the same behaviour from all athletes in the group
- assist when and where requested
- teach the athlete to handle the risk of failure

It is the opinion of this writer to strongly recommend that specific literature be consulted regarding considerations with a particular disability. Equally as important is the contact with specific organisations and the health professionals associated with those organisations for more specific information on an individual and his/her capabilities and restrictions. With the guidelines and recommendations from these specific areas and the knowledge of the individual with a disability the best possible training program can be implemented. Continual monitoring and evaluation is a crucial aspect if a program is to succeed. Above all be flexible and be prepared for a most challenging and rewarding experience.

Future Perspectives

Community awareness, acceptance and support of athletes with disabilities took a giant step forward earlier this year (1998). Three statues of athletes were launched on top of Sydney Tower in preparation for the Sydney 2000 Olympic Games. Included was a female wheelchair basketball player.

Financial support from the government and private sectors is also becoming more available to our athletes with disabilities. This support must continue for our athletes to succeed.

In August 1998 national team of athletes with disabilities returned from the World Championships in Birmingham as the top country in the world. Australia is looking toward the Sydney 2000 Paralympic Games with the aim to stay on top of the medal tally being the best nation in the world. Our athletes are training with these goals in mind. Their commitment to their training and their country is mot inspiring.

References

Brasile FM, 1990; Performance Evaluation of Wheelchair Athletes: More than a Disability Classification Issue. Adapted ACT Quart 7.

Buckley J, 1995; Physios-Vital for Disabled Sport. Sport Health 13 4.

Fernhill B, 1993; Physical Fitness and Exercise Training of Individuals with Mental Retardation. Med and Sci in Sp and Ex.

Goodman S, 1993;Coaching Athletes with Disabilities: General Principles. Australian Sports Commission.

Haas F, Pasierski S, Levine N, Bishop M, Axen K, Pineda H, Haas A 1987; Effect of Aerobic Training on Forced Expiratory Airflow in Exercising Asthmatic Humans. The American Physiological Society.

Linschoten R, Backx FJ, Mulder OG, Meinardi H, 1990; Epilepsy and Sports. Sports Med 10(1).

Lockette KF, Keyes AM, 1994; Conditioning with Physical Disabilities. Human Kinetics, Kingswood SA.
Madden C, 1995; Disabilities in Sport: A Psychological Perspective. Sport Health 13 4.

Shephard RJ, 1988; Sports Medicine and the Wheelchair Athlete. Sports Med 4.

Resistance Training for Prepubescents and Adolescents: A Review

By Mark Shillington, Strength and Conditioning Coach, Wynnum Seagulls, OLD Cup Rugby League

Introduction

The popularity of resistance training among prepubescent and adolescents has increased, and the qualified acceptance of youth resistance training by professional organisations is becoming universal. It is however a controversial subject often obscured by many misconceptions and misunderstandings about resistance training, it's dangers, and how it can be adapted for young people.

The purpose of this article is to address the two questions at the heart of this controversy. Can resistance training cause strength gains in children? And, does resistance training actually harm children's skeletal systems? It will then conclude with a discussion of the appropriate parameters involved in a resistance training program for youth.

Firstly we must begin by defining resistance training. Resistance training involves the individualized prescription and performance of exercises in an attempt to make a child stronger and more powerful.

This is in contrast to the sports of bodybuilding, powerlifting, and Olympic lifting which involve the lifting of maximal or near maximal loads in specified lifts.

The NSCA, the American Orthopedic Society for Sports Medicine, and the American Academy of Pediatrics all suggest that children can benefit from participation in a properly prescribed and supervised resistance training program. The major benefits include:

- Increased muscular strength and muscular endurance.
- Decreased injuries in sport and other recreational activities.
- Improved performance capacity in sports and recreational activities.

Concerns About Injury Resistance training in children, as with most physical activities, does carry some degree of inherent risk of musculoskeletal injury. Yet the risk is no greater than that in most other sports or recreational activities in which children regularly participate.
Zaricznyj et al (1980) in a screening of sports related injuries in school aged children noted resistance training was the nominated cause of 0.7% of 1576 injuries compared to 19% for football and 15% for basketball. This finding is supported by Hamill, 1994.

The NSCA, in it's position statement on youth resistance training (1996), states that "generally the risk of injury associated with resistance training is similar that on the basis of a risks-benefits analysis that the risks of injury from resistance training are far outweighed by the potential for injury prevention in other sports as a result of resistance training (see discussion below).

A traditional area of concern is the potential for training-induced growth cartilage damage to either the epiphyseal plates, epiphysis, or apophyseal insertion (see fig 1). The epiphyseal plate is the weak link in the young skeleton because the strength in the cartilage is less than that of the bone. In some cases, damage to this area of the bone could cause the epiphyseal plate to fuse, resulting in limb deformity and/or cessation of limb growth.

A few retrospective case reports noted epiphyseal plate fractures during adolescence, however, most of these injuries were due to improper lifting techniques, maximal lifts, or lack of qualified adult supervision (NSCA, 1996). Technique resulted injuries often involved the aggressive use of free weights in such exercises as the deadlift, bench press and overhead press. Growth plate fracture's have not been reported in any prospective resistance training studies that were characterised by appropriately prescribed training regimes and competent instruction.

Other examples of exercise induced damage to growth cartilage include Little League Shoulder, Osteochondritis Dissecans in the ankles of young runners, and Osgood-Schlatter disease.

> Conclusions regarding prevention of injury.

A resistance training program for children should not focus on primarily on lifting maximal or near-maximal amounts of resistance. Furthermore, proper technique must always be stressed, because most injuries in resistance training are related to improper exercise technique. Also, children need time to adapt to the stress of resistance training, and some children find it difficult to train or don't enjoy training at a particular age. Interest, growth, maturity, and understanding all influence the child's view of exercise training and proper safety precaution (Fleck and Kraemer, 1987).

Strength Gains **The ability of resistance training to produce strength gains in children and youth has been proven in meta-analysis' by Falk and Tenenbaum (1996) and Payne, Morrow, Johnson and Dalton (1997). A discussion of issues important for the strength and conditioning coach follows.**

- Comparative Trainability Strength gains of roughly 30 to 50% are typically reported in the literature following short-term (8 to 20 weeks) resistance training programs in youth.

There is no clear evidence of any major difference in strength, as measured by selective strength tests, between prepubescent boys and girls.

Reported relative strength gains during prepubescence are equal to if not greater than the relative gains observed during adolescence. Gains in absolute strength however, appear to be greater in the adolescent group and greater still in the young adult group.

- Persistence of training-induced strength gains. Measuring the effects of detraining is complicated by the concomitant growth related strength increases during the same time period. The limited data suggests that training induced strength gains in children are impermanent and tend to regress toward that of normals and/or the untrained youth "catch up" through normal growth and development during periods of detraining. There appears to be no general consensus as to whether 1 session/week is sufficient for maintenance of strength gains, however, two is sufficient.

    - Physiological mechanisms for strength development

In pre-pubescence it appears training-induced strength gains are more related to neural mechanisms than hypertrophic factors. These neural mechanisms include a trend towards increases motor unit activation and changes in motor unit coordination, recruitment and firing – and possibly intrinsic muscle adaptations, as evidenced by increased in twitch torque. In addition improvements in motor skill performance and the co-ordination of the involved muscle group may play a role.

The onset of puberty and a subsequent increase in circulating testosterone is associated with an increased ability for males to make hypertrophic gains. Lower levels of androgens in females limit the magnitude of training-induced muscle hypertrophy, however, other hormone and growth factors (e.g. growth hormone and the IGF's) may be at least partly responsible for muscle development in females.

- Motor fitness skills and sports performance Improvements in selected motor fitness skills have been observed in children following resistance training. As in adults, training adaptations are rather specific to the movement pattern, velocity of movement, contraction type, and contraction force. The potential for resistance training to enhance sports performance seems reasonable because many sports that children participate in have a significant strength or power component.

- Prevention of Injuries With the increasing participation of children

in a wide variety of sports, from football and gymnastics to soccer and track, there is a need for better physical preparation to prevent sport related injuries. Resistance training appears to be an effective injury prevention strategy for adults, and similar mechanisms may help decrease the prevalence of injury in youth sports i.e. strengthening of connective tissue, increased ability of muscles to withstand loading, correction of muscle imbalance etc.
It must be remembered though that resistance training adds to the chronic, repetitive stress placed on the young musculoskeletal system and as such it may be necessary in some incidences for the child to reduce their sport involvement to allow time for preparatory conditioning.

- Health Related Benefits Other health related benefits of youth resistance training include the establishment of healthy living habits at an early age, increases in bone mineral density, management/prevention of childhood obesity and decreases on blood pressure.

- In terms of gains in the above areas, the quality of supervision and the design of the resistance training program appear to be more important than the type of equipment used.

Training Guidelines
Fleck and Kraemer (1987) have put forth the following guidelines regarding questions that need to be considered before a child begins a resistance training program:

1. Is the child psychologically and physically ready to participate in a resistance exercise program?

2. What resistance training program should the child follow?

3. Does the child understand the proper lifting techniques for each exercise in the program?

4. Do spotters understand the safety spotting techniques for each exercise in the program?

5. Does the child understand the safety concerns for each piece of equipment used in the program?

6. Does the resistance training equipment fit the child properly?

7. Does the child have a balanced physical exercise program (i.e. participate in CV activities and other sports in addition to resistance training)?

If these questions are answered such that it is deemed appropriate for the child to begin resistance training the next step for the strength and conditioning coach involves a needs analysis and program design.

A well organized and well supervised basic training program for children need not be any longer than 20-60 minutes per training session, three times per week. Initially the program should focus on low load exercise with : emphasis on developing good technique in the basic lifts, correction of muscle imbalance, creating a supportive and enjoyable training environment and ensuring the child has a well rounded program which incorporates not only strength training, but also, exercises for flexibility, CV endurance and motor skill acquisition and development. Warm-up, cool-down and flexibility exercises should be part of every session.

Special considerations for youth resistance training programs include:

- Exercise tolerance: It would seem better to start off conservatively than to overshoot a child's exercise tolerance and reduce the child's enjoyment/ increase the risk of injury. Dramatic changes in the tolerance to resistance training programs can reflect the increased maturity of the child and hence allow the progression to more advanced programs.

- Needs Analysis Children need to develop CV fitness, flexibility, and motor skills as well as strength. Individual determination of goals, acceptability, and physical and psychological tolerance is the key component of the training program.

- Developmental differences: The

physiological age (measured by the maturation of the various body systems) rather than the chronological age will determine the functional capabilities and performance for the child, this should be considered when designing a program.

- Individualized resistance training programs: The total program should include:

    1. Conditioning of all fitness components
    2. Balanced choice of exercises for upper and lower body development
    3. Balanced choice of exercises for muscles on both sides of a joint
    4. Use of body part as well as structural exercises
    5. Early emphasis on strengthening key muscle areas e.g. the glutes and deep abdominals and the rotator cuff musculature

    No major distinction between girls and boys programs need to be made in prepubescents, however, with the onset of puberty the idiosyncrasies of the female physiology will necessitate further special considerations which are beyond the scope of this article. (Fleck and Kraemer, 1987).

The progression of the youth to more advanced programs including sports specific lifts and greater loading intensities should occur at a point which both the S&C coach and the athlete feel is appropriate. It would seem that a basic introductory program addressing the above guidelines and lasting at least one year would be appropriate prior to attempting more advanced programs (i.e. especially programs containing loads in the 1-5RM range), however, longer periods may be needed for certain athletes (e.g. "late maturers"). As a guide it would seem that from approximately the age of fourteen years that more advanced exercise methods could be incorporated into the program, this guideline is supported by Fleck and Kraemer (1993). This would allow the young athlete, after the establishment of an initial base, to maximize the gains during the 'developing' years as an important step in an athlete development model.

It should also be mentioned that youth and parents should be discouraged from copying elite programs. From the authors experience it would seem reasonably common practice for young athlete to obtain programs from older athletes and attempt to follow them. Practices such as this are dangerous as the majority of these programs are designed for athletes with several years of resistance training experience. The youth should be encouraged to begin with an initial introductory program and explained the likely progression of gains until the need for elite programs.

Finally, as with all programs implemented by the strength and conditioning coach youth resistance programs should follow an appropriate periodization schedule. Usually this schedule will be part of a long term athlete development model. The discussion of such models is beyond the scope of this article, however, readers are referred to Bompa (1994) for an introduction to this concept.

Conclusion

Most children would benefit from resistance training programs to help enhance physical fitness and sport performance or to reduce the probability of injury during sport and recreational activities. The resistance training programs of youth have specific requirements which differ to those of the adult and it is important that those who are responsible for the design and implementation of these programs are aware of these.

Selected References

1. Blimkie, C. Resistance training during pre-and early puberty: efficacy, trainability, mechanisms, and persistence. *Canadian Journal of Sports Science.* 17(4): 264-279. 1992.

2. Bompa, T. Theory and Methodology of Training: The key to athletic success. Dubuque, Iowa: Kendall/Hunt Pub Co. 1994.

3. Faigenbaum, A. and Kraemer, W. Youth Resistance Training: Position Statement Paper and Literature Review (NSCA). *Strength and Conditioning* 18:62-75. 1996.

4. Falk, B. and Tenenbaum, G. The effectiveness of resistance training in children: A metaanalysis. *Sports Medicine* 22(3): 176-184.1996.

5. Fleck, S., and Kraemer, W. *Strength Training for*

Young Athletes. **Champaign, IL: Human Kinetics, 1993 Fleck, S., and Kraemer, W.*Designing Resistance Training Programs.* Champaign, IL: Human Kinetics, 1987.**

6. Hamill, B. Relative safety of weight lifting and weight training. *Journal of Strength and Conditioning Research.* 8:53-57. 1994.

7. Payne, V., Morrow, J., Johnson, L., and Dalton, S. Resistance training in children and youth: A meta-analysis. Research Quarterly for Exercise and Sport 68(1):80-88. 1997

8. Zarrcznyj, B., Shattuck, L, Mast, T., Robertson, R., and D'Elia, G. Sports-related injuries in school-aged children. American Journal of Sports Medicine. 8:318-324, 1980.

Does Weight Training Cause "Bulking Up" in Women?

By Thomas Reddin, (B.App.Sci. Ex & Sp. Sci)

INTRODUCTION

Having been either working or working out in gyms for nearly twenty years, one of the most noticeable developments in recent years has been the increasing numbers of women who have added weight training to their exercise regime. Indeed, after years of gentle prodding by her own son, my 54 year old mother has recently embraced weight training to the point that she now hires a personal trainer for twice weekly sessions!

However, the belief still remains amongst many women that weight training is not appropriate for their gender. In particular, their main objection is that weight training will "bulk" them up and make them appear unfeminine. This stereotype seems to have resulted partly from the pictures of women who compete in body-building, and from the fact that the weights room *is* normally frequented by men who do indeed want to bulk UP

So, does weight training "bulk up" women? In a bid to try and shed some light on this issue I recently reviewed scientific research on women and weight training dating back to the 1970's-The findings are summarised in the paragraphs that follow.

Fleck & Kraemer (1987) summarised the effect of weight training on body fat in seven studies conducted over 25 years. Although both the length of the studies and the weight training protocols (i.e. sets, reps, exercises etc) differed, the one consistent finding was the result. Every single study showed that the women who did weight training got a decrease in body fat%.

Table 1 : Weight training and its effect on body fat % in women (Fleck & Kraemer, 1987)

Study	Length of study (wks)	Change in fat %	Training Protocol
Withers, 1970	10	-1.8	• 3x/week for 10 weeks • 1 set x 30 sec rep @40-55% • 10 exercises
Brown, 1974	24	-2.3	• 3x/week for 24 weeks • 5-6 sets x 3-10 reps • 4 exercises
Mayhew, 1974	9	-1.3	• 3x/week for 9 weeks • 2 sets by 10 reps • 11 exercises
Wilmore, 1978	10	-1.9	• 2x/week for 10 weeks • 2 sets x 7-16 reps • 8 exercises
Hunter, 1985	7	-1.5	• 3x/week for 7 weeks • 2-3 sets x 7-10 reps • 7 exercises
Staron, 1991	20	-4.0	• 2x/week for 20 weeks • 3 sets x 6-12 reps • 3 exercises
Staron, 1994	8	-2.9	• 2x/week for 8 weeks • 2 warm up sets + 3 sets x 10-12 • 3 exercises

FINDING # 2: Weight Training Increases Muscle & Metabolic Rate in Women.

The explanation for how weight training caused this decrease in body fat% in women can perhaps be found in additional studies which show that weight training increased both muscle mass and metabolic rate in women. A 2002 study by Poehlman et al showed that out of a group of young women (age 18-35) those that followed a thrice weekly, 6 months weight training routine increased lean muscle (ave 1.1 kg) and metabolic rate (ave 60 Kcal/day) whereas those that followed a thrice weekly 6 month running programme achieved neither an increase in lean muscle OR metabolic rate. Furthermore, Ryan et al (1995) showed that older women (ave age 50-69) that completed 16 weeks of weight training achieved increases in both lean muscle (ave 1.1 kg) and metabolic rate (ave 53 Kcals/day).

From looking at these studies we can see that weight training does indeed seem to add muscle to females, just as it does to males. Female muscle is no different to male muscle, and so this should not be totally surprising. However, does this increase in muscle result in the woman "bulking up" - that is, is there an increase in the size of her body parts such as legs, arms, and so on? Further studies that looked specifically at this can hopefully shed some light.

FINDING #3: Weight Training Does NOT Increase Body Part Circumferences in Women.

In 1974 Mayhew & Goss took 27 untrained females (ave age 21) and put them through 9 weeks of weight training. The women trained 3 times a week, completing 11 exercises at 2 sets x 10 RM. At the end of the 9 weeks the women had increased their muscle mass (ave 1.5 kg) and had decreased their fat mass (ave 1.1 kg) but there was NO increase in the size of either the thigh, chest, calf or neck and only a very small (7mm) increase in arm circumference. The authors of the study concluded that "opposition to high resistance weight training in women, based on the supposition it will produce 'bulky muscle' is totally unfounded" (Mayhew & Goss, 1974)

Critics of this study and its findings might point to the fact
that the study was relatively short in duration (9 weeks), and that the training protocol used was perhaps not optimal for achieving maximum
hypertrophy. In light of these criticisms, it is worth looking at two further studies that examined the effect of weight training on female body part circumferences.

A 1989 study by Staron et al took 24 women (ave age 23) and weight trained them twice a week for 20 weeks. The training protocol involved the women completing 3 sets of 6-8RJM at slow speed (4-6 *sees)* on each of the following 4 lower body exercises: full squats, vertical leg press, leg extension and leg curls. The authors measured thigh girth at the start and then again at the end of the 20 week training period and found that there had been NO increase in thigh girth. However over the twenty weeks the females did lose body fat, increase lean muscle and increase strength.

Similar findings emerged from a study by Brown & Wilmore (1974) where seven female track and field athletes (age 16-23) weight trained 3x/week for 6 months. Each session lasted 60-90 mins and consisted of *5-6* sets of 4-10 reps (to failure) on the following exercises: Bench Press, Squat or Leg Press, Lateral raises or pullovers. Although there was a very slight increase in arm circumference (5mm), once again thigh measurement was unchanged. Furthermore hip and waist measurements actually decreased.

If male muscle is no different to female muscle physiologically, why then does weight training not cause noticeable increases in female body circumferences? One plausible explanation is the different level of anabolic hormones seen in men and women, particularly
testosterone. Testosterone is a known muscle-
building hormone. Indeed anabolic steroids are synthetic derivatives of this very hormone. A famous study (Kraemer et al, 1991) illustrated that not only do women have significantly lower testosterone levels than men (approx 10 times less), but the acute increase in testosterone that occurs in men with weight training does not occur for women (see Fig 1).

Summary and Conclusion

Many women are put off weight training by the belief that it will cause them to "bulk up" and consequently appear unfeminine. The primary aim of this article was to try and clear up this myth by reviewing scientific research that had looked into this. It is concluded that, while women slightly increased their muscle mass and decrease fat mass through weight training, no noticeable increase is seen in the circumference of women body parts, even if the weight training is of a heavy nature.

References

Poehlman, E.T., Denino, W.R, beckett, T., Kinaman, K.A., Dionne, I J., Dvorak, R, & Ades, P.A. Effects of Endurance and Resistance Training on Total Daily Energy expenditure in Young Women: A Controlled Randomized Trial. The Journal of Clinical Endocrinology & Metabolism, 2002,87(3)

Ryan, A.S., Pratley, R.E., Elahi, D. & Goldberg, A.P. Resistive training increases fat-free mass and maintains RMR despite weight loss in postmenopausal women. Journal of Applied Physiology, 1995,79(3): 818-823

Fleck, S.J. & Kraemer, W.J. (1987) Designing Resistance Training Programs, Human Kinetics, Champaign, II. USA

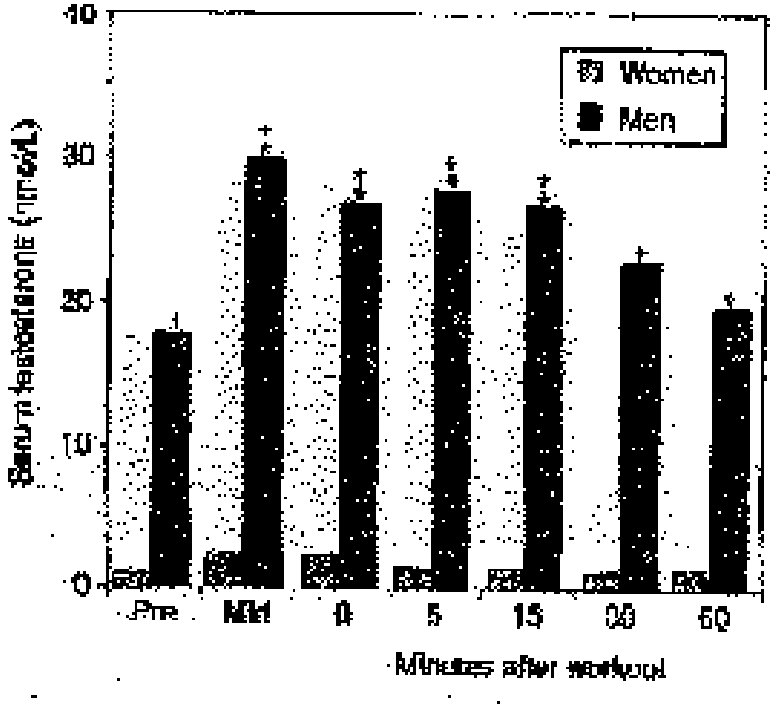
Kraemer, W.J. **et** al. Endogenous anabolic hormonal and growth factor responses to heavy resistance exercise in males and females. International Journal of Sports Medicine, 1991,12:232.

Mayhew, J.L., & Goss, P.M. Body composition changes in young women with high intensity weight training. Research Quarterly (1974), 45:433-40

Staron, R.S., Malicky, E.S., Leonardi, M.J., Falkel, J.E., Hagerman, F.C. & Dudley, G.A. Muscle hypertrophy and fast fiber type conversions in heavy resistance-trained women. European Journal of Applied Physiology (1989) 60:71-79

Brown, C.H. & Wilmore, J.H. The effects of maximal resistance training on the strength and body composition of women athletes. Medicine and Science in Sports, 1974,6(3): 174-177.

Figure 1 : The effect of weight training on testosterone levels in men (dark) and women (Light). Fleck & Kramer, 1987.



UNIT 14

Risk Management & Ethical Issues

Harassment-free Sport Questions and Answers

Extract from Harassment-free Guidelines, Australian Sports Commission, Canberra

Harassment particularly sexual harassment is being recognized increasingly as a matter of real concern within the sporting and recreation industry. Individuals in sport can be particularly vunerable because it is a movement characterized by close relationships. Coaches have enormous influence over athletes and their sense of self esteem. If used recklessly or irresponsibly this influence can cause great harm. This is particularly so because coaches work with athletes younger themselves. It's therefore essential operate at all times with professionalism and integrity in these relationships.

Harassment can occur in different forms, examples include:

- jokes or comments directed at a person's body, looks, age, race, religion, sexual orientation or disability
- unwelcome remarks, including teasing, name calling or insults
- innuendo or taunting
- homophobic comments, or comments about a person s sexual orientation and/or behavior
- persistent questions or insinuations about a person's private life
- repeated invitations to go out, especially after prior refusal
- offensive or embarrassing email and/or facsimile messages
- displaying or disseminating offensive graphic material including posters, calendars, cartoons, graffiti
- staring, leering, ogling
- inappropriate touching or deliberately brushing up against a person
- massaging a person without invitation
- promises or threats in return for sexual favours
- behaviour that humiliates, and
- behaviour that creates a hostile environment.

Harassment is different from normal friendly jokes or conversations. Harassment consists of words or actions that upset people and is usually intended to. It makes participation in sport unpleasant, humiliating or intimidating for the person or group targeted by this behaviour. Harassment in sport must not be confused with legitimate comment and advice, including relevant negative comment or feedback from coaches on athletic performance, or on the work or sport-related behaviour of an employee or an athlete. Feedback differs from harassment in that it is intended to assist the employee or athlete to improve performance or the standard of their behavior.

INTIMATE RELATIONSHIPS

Although not every intimate relationship between a coach and an athlete is based on an abuse of power by the coach (which would constitute harassment), such relationships are a danger area. This is because there is usually a great disparity between a coach and athlete in terms of authority, maturity, status and dependence, even if the athlete has reached the legal age of consent. Intimate relationships between coaches and adult athletes, while not against the law, can have harmful effects on the individual athlete involved, on other athletes

and coaches and on die sport's public image.

Because there is always a risk that the relative power of the coach has been a factor in the development of such relationships, you, the coach, are advised to avoid sexual relationships with athletes altogether, regardless of the athlete s age. Other professionals who have responsibility for the physical and mental well-being of their clients, such as doctors and counsellors, have adopted and work to similar ethical requirements.

You should not only refrain from initiating a relationship with an athlete, but should also discourage any attempt by an athlete to initiate a sexual relationship with you, explaining the ethical basis for your refusal.

To assist the individuals and organisations to deal with harassment issues, the Australian Sports Commission (ASC) has developed a national anti-harassment in sport strategy The strategy includes guidelines that show Low athletes, coaches and parents can contribute to a positive and safe environment by ensuring their behaviour *is* appropriate at all times.

The guidelines for coaches provide an ethical framework for their behaviour when working with athletes, and are offered as a way of promoting sensitivity and professionalism on the part of coaches. These guidelines reiterate sections of the Australian Coaching Council's Coaches Code of Ethics, and discuss them in more detail.

The guidelines for harassment-free sports, published by *that* ASC, are available from national sporting organisations. Please contact your national sporting organisation if you would like to get a copy. For further information contact the Participation Division, Australian Sports Commission, PO Box 176, Belconnen ACT 2616, tel (02) 6214 1960 or (02) 6214 1634.

The following are commonly asked questions and answers on harassment in sport.

Q Is harassment sufficient grounds for dismissal from employment?

A Some cases of harassment may well be grounds for dismissal. However, under Australian law, an employer must not dismiss an employee in a manner that is 'harsh, unjust or unreasonable' *(Workplace Relations Act 1996).* An employee is entitled to make a claim for unfair dismissal if this occurs.

An employer must therefore ensure, before dismissing an employee, that the employee has been given an opportunity to defend themselves against any allegations and mat a fair procedure has been followed leading up to the dismissal.
If these requirements are met, an employer may lawfully dismiss an employee:

- summarily (that is, without notice or pay in lieu of notice) in cases of proven serious misconduct, or
- with notice (or pay in lieu of notice), if there is a valid reason for dismissal and a fair procedure has been followed as defined in the legislation

Some cases of harassment may amount to serious misconduct warranting summary dismissal. Serious misconduct is defined as 'misconduct of such a nature that it would be unreasonable to require the employer to continue employment during the required period of notice*. This may apply in cases of harassment where the continued presence of the employee is considered to be a danger to others in the workplace.
The employer must give *the* employee the chance to respond to any charge of serious misconduct. This process will be assisted if the employer has adopted and follows a harassment complaints procedure that provides for a fair investigation of allegations of harassment, including providing an opportunity for. the alleged harasser to respond to allegations.
Similar principles apply to dismissal witii notice. This option may be appropriate in less severe cases of harassment, which are nonetheless unacceptable in the sport environment. The employer is required to prove:

- that there is a valid reason for dismissal (this can include the conduct of the employee), and
- that a fair procedure has been followed, for example the employee has been warned that the conduct is unacceptable, has been given an opportunity to improve and has failed to do so.

Whether for the purposes of summary dismissal or dismissal with notice, it will assist in establishing procedural fairness if the employer has, prior to the problem arising, made clear to all employees that harassment is considered to be misconduct. This could be done via a clause in employment contracts specifying that proven serious harassment constitutes grounds for dismissal, or via an anti-harassment policy specifying the same, which has been supplied to all employees.

Note: The above summary deals only with the general provisions of the federal law on termination of employment. Different requirements may apply for employees covered by state industrial relations laws, or whose awards have specific termination of employment clauses that are better than the general legislative provisions.

Spotting organisations arc advised to consult a lawyer or their employer organisation to determine which industrial lam opplj to them and what their specific requirements are before taking dismissal action for harassment.

Q Can a sporting organisation refuse to hire an employee on the basis of rumours or charges, but without a finding or conviction of harassment?

A No, but a sporting organisation can establish whatever criteria it wishes to recruit volunteers and staff, provided the criteria reasonably reflect me qualifications and skills that are needed for success in the position and are implemented fairly for all candidates. It is not unreasonable to include criteria that help the hiring committee evaluate the contributions die candidate can make to the team atmosphere, and the extent to which the candidate shares and is committed to the values of die organisation. Interview tools can be developed which will measure this fit of values and ethics, and should succeed in screening out those candidates who have a history of harassment.
The sporting organisation may also wish to state quite clearly in its recruitment policies that it will not consider candidates who have at any time had a harassment case against them substantiated, or have been convicted of assault, sexual assault, or a related sexual offence. It is entirely within the power and authority of a sporting organisation to establish and implement such a recruitment policy.

Q If a coach is found guilty of harassment or of a sexual offence, should his or her coaching accreditation be withdrawn?

A This is a complex issue which is being debated by the Australian Coaching Council (ACQ and lawyers. A sporting organisation can withdraw coaching privileges and/or membership privileges if they have an internal discipline or sanctions policy authorising them to do so.

If the sport requests the ACC to withdraw a coach from its database following a substantiated accusation of harassment, the ACC will do so where it is satisfied that the accused person has been accorded natural justice. In these instances die ACC may seek independent legal advice.

The discipline/sanctions policy should be clearly linked to the constitution or articles of association of the sporting organisation. Any such policy should also include steps to ensure an accredited person is accorded 'natural justice'.

Q What if the harasser didn't mean to cause offence?

A The intention or motive of the alleged harasser *is* not a relevant consideration when determining whether the behaviour was unwelcome. 'Innocent* intention is not a defence in harassment cases.

Q Does a person have to tell the harasser their behaviour is unwelcome?

A No. A complaint of harassment can be successful even if the complainant did not inform *the* harasser that their behaviour was unwelcome. Decisions take into account the reasons why someone may feel unable to confront a harasser directly. Factors which might be relevant include the youth and inexperience of the complainant, being in shock or surprise, fear of reprisals and the nature of the power relationship between the parties.

Q If another organisation asks for a reference for a coach/employee who was dismissed because he or she was a harasser, what can the previous employer tell the other organisation?

A The previous employer can tell the other organisation the truth based on the facts. If the previous employer has an anti-harassment policy in place, with procedures for investigation and discipline, the facts of a formal complaint of the harassment can be firmly established. It would be inappropriate for the ex-employer to report information based solely on suspected or rumoured harassment.

An advantage of an effective anti-harassment policy is that it may allow information about harassers, and about abusers of formal complaints procedures, to be made public without the previous employer running the risk of being accused of slander or defamation.

Q What about the situation where an organisation allows an employee to resign (rather than face dismissal) because of harassment, but will not disclose this information?

A In return for an unwanted employee leaving voluntarily, and to avoid negative publicity, some organisations will promise to maintain confidentially. Typically, such situations involve rumours or allegations of harassment, but no investigation or proof. A recruiting organisation cannot force this information from a previous employer. In reviewing candidates for new positions, however, it can include interview questions about *the* candidate s reasons for leaving previous employment.

Q If a coach and an athlete, who are over the legal age of consent, are having a consensual sexual relationship, is this harassment or sexual assault?

A It may not be either. In the *eyes* of the law, a person over the legal age of consent has the right to consent to sexual activity or a sexual relationship. However, the law also recognises that this matter of 'consent is not so straightforward in situations where there is a power or authority relationship, such as exists between a coach and an athlete, for this reason alone such relationships should be strongly discouraged.

Another reason for discouraging these relationships, particularly in the high performance level, is that they lead to bias and the perception of bias, in the part of the coach.