Physiotherapy for Athletes with Cerebral Palsy

Introduction:

Cerebral (of the brain) Palsy (lack of muscle control) is an impairment that affects movement and posture. Cerebral palsy (CP) can affect a person's posture and ability to move, balance, communicate, eat, sleep and learn. CP involves injury to the developing brain that occurs before, during or after birth. There is no single cause of CP. In some cases people with CP may also have additional impairments (e.g. impaired speech, epilepsy, intellectual disability, vision impairment).

According to the CP Alliance of Australia three in four people with CP experience pain. Pain is often a result of the impairments that are associated with CP (e.g. contractures, abnormal postures, dystonia). Speech impairments and communication difficulties are present in 1 in 4 people with CP. Strategies for communication will be highly individualised.

Athletes with CP may experience specific learning difficulties. These may include a short attention span, motor planning difficulties (organisation and sequencing of movement), perceptual difficulties, behaviour issues and language difficulties. Individuals with CP need to put more effort into concentrating on their movements and sequence of actions than others, so they may tire more easily. The way that individual athletes with CP learn might vary and it can be useful as a physio to understand learning preferences.

While CP will be present for life, individualised training and exercise programs can greatly improve physical development, fitness, health and function.

Types of CP:

CP can be classified as either quadriplegia (four limbs affected), diplegia (both legs affected) or hemiplegia (predominantly a unilateral effect, arm and leg on one side of the body).

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Movement dysfunction as a result of CP is typically attributed to damage in one of three main areas, namely the motor cortex, cerebellum or basal ganglia.

- Motor cortex damage results in hypertonia, where muscles demonstrated increased levels of tensions (spasticity) and a decreased ability to stretch.
- Cerebellum damage results in ataxia, which is observed as a tremor and inability to control accurate movement. Affects voluntary movements, and causes uncoordinated movement. Affects balance and sense of positioning in space.
- Basal ganglia damage results in athetosis, which is characterised by involuntary slow and writhing movements.

Likely conditions within CP and potential impact: please note that there is a great variance in the way individual athletes with CP present.

Motor Impairment	Presentation	Physiotherapy and Sport considerations
Spasticity / hypertonia	Increased muscle tone, increased resistance to movement (greater with increased movement velocity), may affect coordination of movement and gait. May cause reduced range of motion. Will worsen with fatigue.	Pacing and intensity of exercises and training, recovery time, altering speed of movement can assist learning – use a gradual increase in speed as proficiency improves. Compression garments may assist affected limbs.
Startle reflex	Prone to extensor reaction to sudden stimuli (e.g. loud noises)	Unlikely to respond to desensitisation to stimuli (e.g. starters pistol, crowds at events). Try reducing the stimulus using ear plugs or dark glasses.
Ataxia	Incoordination, poor balance, may appear like the athlete is struggling to learn new tasks. Sometimes athlete might be better at a dynamic task than a static one.	May need to break movement patterns down initially into small segmented movements. May need to repeat tasks until learnt.
Athetosis	Involuntary contractions of muscles	Involuntary movement can increase with effort. Fitness and training will enable better function. Providing a stable base of support can help (e.g. seated athletes can use good trunk support and more contoured seating interfaces).

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Secondary impairments may be evident and can affect the way an athlete moves. These might include:

- Weakness or reduced power
- Joint contracture
- Reduced range of movement
- Altered biomechanics/movement patterns
- Impairments in motor planning, learning and strategies
- Increased fatigue (a person with CP utilises more energy doing tasks)
- Reduced sensation
- Altered sensory field deficits

Physiotherapy Considerations:

- Start by asking the athlete to describe their own impairment and the way it affects them. It can be helpful to keep in mind that every presentation is unique and the athlete is the expert in their own body.
- Be aware of the athlete's function and range of movement. Adapt activities to maximise function.
- Be aware of any movement restriction, spasticity, balance and coordination challenges, and take these into consideration with relevant drills or exercises. It is good to help athletes practice their balance in a safe way, as well as lay down the foundation for optimal basic movement patterns.
- Fatigue due to the increased physiological cost of moving around has a big impact on these athletes, and their symptoms (i.e. spasticity can become more pronounced with increased effort or under fatigued conditions).
- Consider what other areas and structures are getting loaded as a result of how the athlete moves, or the asymmetries that exist.
- Athletes with increased tone often respond well to some long sustained stretches of commonly affected areas (calves, hip flexors, adductors, hamstrings and forearms for wheelchair athletes). They also respond well to PNF/contract relax stretches as well.
- Increased tone and reflexive movement can place greater stress on equipment – ensure adaptive equipment is designed accordingly to avoid damage.

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- Adapt equipment to compensate for postural asymmetries. Work with Sports Seating and Engineering to develop customised equipment interfaces. Will often need to accommodate to the posture rather than correct to an “anatomical norm”. Aim for symmetry as much as possible for ideal joint and body loading, recognising that this isn’t always possible.
- Ensure that the athlete interfaces with any braces or adaptive equipment well. Monitor training load and adjust load/repetition as required. If an athlete is using a new brace or piece of equipment, close monitoring of the fit and skin integrity is required.
- Consider modified grips for adaptive equipment or weights training to compensate for any dexterity and fine motor issues.
- For those athletes who are wheelchair users, ensure there is appropriate time out of the wheelchair as well so that the athlete can change position and lengthen out through legs, hips and spine where possible. Lying prone can be particularly helpful with lengthening out through the hips and providing a sustained stretch.
- For athletes that are wheelchair users encourage regular maintenance and review of their chair to ensure optimal function and promote injury prevention.
- As a result of the activity and load the upper limbs are subjected to these athletes often present with forearm tightness. Sustained stretching through the forearm muscle groups can be useful.
- For those athletes who are wheelchair users, understand how the athlete performs different transfers, level of assistance required, and whether they use any other adaptive equipment (slide sheets or boards). Also consider what their bathroom set up is in terms of equipment (commode and shower chair). Work on strength and range of motion to ensure optimal transfer technique to minimise risk of injury. Consider and plan around this for travel in terms of accessible accommodation and adaptive equipment.
- Be aware if the athlete has any other interventions (e.g. botox to manage their symptoms), and be familiar with the frequency and effects of this on the athlete and their function.

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Medical risk factors:

Seizures: This is often managed through regular medication. Speak with the athlete about patterns and risk factors for seizures and how best to manage if they occur. There might be times of the day when function is best – base physiotherapy sessions, rehab and training schedules around this if required. Sleep quality and quantity might be essential.

Chest infection: CP can impact on swallowing and lung function. If an athlete is at higher risk be mindful of exposure to colds and viruses.

Thermoregulation: May overheat quickly as the athlete often has to use more muscles and work harder to coordinate movements, thus there is an increased physiological cost to ambulation and moving around. Athletes may have problems in hot, humid conditions. Individualised cooling strategies are required.

Pressure injuries/skin integrity: Some of the common sites for skin and pressure injuries include the buttock and sacrum (from prolonged sitting) and other areas over bony prominences. Ensure regular checks of braces, adaptive equipment and seated equipment (sporting and day use) occur to ensure appropriate seating and pressure management is in place.

Intellectual impairment: Sometimes athletes with CP also have an intellectual or learning impairment (the rate is around 50%). This needs to be considered in the way you communicate with the individual. Refer to PA reference “coaching athletes with intellectual impairment”.

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Resources, Links and References

Cerebral Palsy Alliance. https://cerebralpalsy.org.au/

https://cerebralpalsy.org.au/our-research/about-cerebral-palsy/what-is-cerebral-palsy/facts-about-cerebral-palsy/

https://www.aspetar.com/journal/viewarticle.aspx?id=430#.XdOWSFczY2w

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Palisano R, Rosenbaum P, Walter S, Russell D, Wood E & Galuppi B (1997). Development and validation of a Gross Motor Function Classification System for children with Cerebral Palsy.

Developmental Medicine and Child Neurology, 39, 214-223. CanChild Centre for Childhood Disability Research www.canchild.ca. Australian Cerebral Palsy Register Report 2013 www.cpregister.com.

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