



# Concussion Update: The Importance of Exercise

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In 2017, the Berlin Concussion in Sport Group (CISG) consensus statement included updates from the 2014 Zurich consensus statement around how concussion is defined and managed, as well as discussing some new areas for diagnosing concussion including blood bio markers.

A few of the important changes included redefining concussion as a traumatic brain injury induced by biomechanical forces involving a blow to the head, neck, face or elsewhere on the body. Where previously it involved only a direct or indirect blow to the head, neck or face. This redefinition broadens the mechanism of how concussion can occur, as concussion can occur in the absence of trauma to the head, neck and face.

Management of concussion involving exercise is another area that has since changed. Previously the advice given was for exercise to only be reintroduced via a graded return to play program once the acute concussion symptoms had

resolved. However, the 2017 consensus statement now advises 1-2 days of physical and mental rest followed by a reintroduction of exercise, but under the levels that aggravate the concussion symptoms or makes the concussion symptoms worse.

This leads into some highly relevant, important and recent research from Dr John Leddy at the University of Buffalo in the use of exercise in the treatment of concussion. Dr Leddy has been researching the affects of exercise on concussion and has developed the Buffalo Concussion Treadmill Test (BCTT) and the Buffalo Bicycle Concussion Test (BBTT). These are simple assessment tools where a patient's/athlete's symptoms are measured against a VAS and then placed on either a treadmill or stationary bike with heart rate (HR) monitors. As they exercise their HR and concussion symptoms are monitored as the difficulty of the exercise increases, until their concussion symptoms return or are exacerbated. From these results

patients are given a target HR they need to achieve during exercise which is approximately 80-90% of the HR that exacerbates their concussion symptoms.

This submaximal threshold target HR is then used during exercise on a stationary bike or treadmill, exercising at a minimum of 20 minutes per day, 6-7 days per week. The objective is to increase the target HR by 5-10 bpm in athletes and 5 bpm in non-athletes each week, without symptom exacerbation. At present it is unclear how quickly patients/athletes can reintroduce exercise after their concussion injury, however following the Berlin guidelines of 1-2 days physical and mental rest before commencing exercise appears appropriate.

A question often asked by patients/athletes who have sustained a concussion injury is why do they feel unwell (headaches, dizziness) when they exercise. As discussed in Berlin these concussion symptoms are thought to occur due to a disruption to the autonomic nervous system (ANS). Concussed patients exhibit hypoventilation when exercising which leads to a build up of carbon dioxide in the blood. Concussed patients also have abnormally low sensitivity to arterial carbon dioxide, so in response the ANS increases cerebral blood flow triggering off the headaches, dizziness and cessation of exercise.

Submaximal aerobic exercise increases the arterial carbon dioxide sensitivity back to normal levels, normalizing arterial carbon dioxide, exercise ventilation, cerebral blood flow, exercise tolerance and resolution of concussion symptoms.

Dr Leddy's research shows that getting concussed patients/athletes to exercise much earlier than previously thought is beneficial in the treatment and recovery from concussion. Concussion athletes still need to work through a graded return to play exercise program before they are cleared to play.

This is another strong example of the importance of exercise as medicine and how chiropractors can be incorporating exercise medicine into their everyday practice. ■

## REFERENCES

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