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**Post Concussion Syndrome**

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### What is Post Concussion Syndrome?

- Post concussion syndrome (PCS) is the prolonged occurrence of a variety of neurological symptoms that are sustained up to 1 month to years after a concussion (Guinto & Guinto-Nishimura, 2014).

### Signs and Symptoms

The presentation and length of the signs and symptoms of PCS is highly variable and may look different in each patient. According to McTuffy (2017), patients with numerous symptoms in the immediate post-concussion recovery period tend to have lingering symptoms (PCS). There is debate on whether the presence of preexisting conditions such as depression or mood disorders affect the possibility of a patient developing PCS. Additionally, despite the high variability of the symptoms of PCS, persistent headaches are the most commonly reported symptoms (Philips & Reddy, 2016).

### Diagnosis

- Post concussion syndrome (PCS) begins with a concussion which is caused by direct force to the head. This usually occurs as a result of a coup contre-coup injury, falls, or blows sustained to the head. (McTuffy, 2017).
- The force that is exerted on the brain causes the release of excitatory neurotransmitters. (McTuffy, 2017).
- The main neurotransmitter that is released is glutamate. Glutamate binds to the N-methyl-D-aspartate (NMDA) receptors which cause an efflux of potassium-out of the cell, while calcium rushes into the cell. (McTuffy, 2017).
- The increase in intracellular calcium causes mitochondrial dysfunction, the release of free radicals, and apoptosis. (McTuffy, 2017).
- As the cell attempts to restore homeostasis, the workload of the ATP powered Na/K pump is increased along with a higher demand for glucose to power these pumps. (McTuffy, 2017).
- As the mitochondria continue to fail, lactate builds up at the cells resort to anaerobic glycolysis. (McTuffy, 2017).
- This state of mitochondrial acidosis increases cellular permeability, worsening the ion imbalance and creating a cycle that is hard to break. (McTuffy, 2017).

### Underlying Pathophysiology

- There is evidence that PCS is caused by alterations in brain excitability including disorders of synaptic plasticity, neuronal sprouting, as well as excitatory-inhibitory imbalances. (McTuffy, 2017).
- Some of the cognitive deficits found in PCS could be due to the alterations in the hypothalamic-pituitary-adrenal axis as many of the glucocorticoid receptors are found on the brain, particularly the hippocampus. (McTuffy, 2017).
- Diffuse brain damage, damage to axonal cytoskeleton from mechanical force of the injury, is another potential cause of some of the neurological deficits in PCS (Guinto & Guinto-Nishimura, 2014). (McTuffy, 2017).
- Kaminis and Giza (2016) note that most of this metabolic mismatch occurs in severe traumatic brain injury (TBI). However, they state that both severe TBI and concussions seem to have an effect on cerebrovascular flow as a result of this abnormal metabolic activity. (McTuffy, 2017).
- In most cases, this effect on cerebrovascular flow resolves in 1 to 7 days, but patients with symptoms persisting more than a month more likely to have continuing decreased cerebrovascular blood flow (Kaminis & Giza, 2016). (McTuffy, 2017).

### Implications for Nursing Care

- It is important to obtain a detailed history of conditions and symptoms prior to and after a concussion as PCS presents differently in each person and PCS symptoms can magnify preexisting psychiatric conditions. (McTuffy, 2017).
- Prevention of additional head injuries and concussions is important as doing so can cause further complication in PCS recovery. (McTuffy, 2017).
- Prevention and safety education such as the use of a helmet for appropriate activities and limiting or restricting participation in certain activities may be necessary. (McTuffy, 2017).
- It is important to recognize that sleep disturbances, headaches, vestibular and emotional disturbances may occur in PCS in different severities and durations that vary from person to person. (McTuffy, 2017).
- Because of the variability of symptoms, treatment for each patient cold look different. (McTuffy, 2017).
- Some interventions include the addition of various medications such as SSRIs or vision/physical/occupational therapy. (McTuffy, 2017).
- Regardless of the treatment plan, the emotional needs of the patient need to be addressed as the loss in their ability to function ‘normally’ can produce frustration and depression. (McTuffy, 2017).
- Patient and family education, as well as cognitive behavioral therapy and helping the patient to identify support systems can help address these emotional needs. (McTuffy, 2017).

### Conclusion

Concussions, though rapid in onset, have the potential to cause symptoms that can have a significant and chronic effect on a person’s ability to function in everyday life. Symptoms of PCS are vague, ranging in severity from mild to debilitating. Diagnosis is highly dependent on patient history and report of symptoms. (McTuffy, 2017).

It is important that PCS treatment is focused not only on symptom management, but on emotional support as loss of norm functioning can be distressing to PCS patients as well as worsen the symptoms that are already present. (McTuffy, 2017).

Increased awareness and a better understanding of the pathophysiology of this syndrome can aid in treating PCS as a condition and not as a set of symptoms. (McTuffy, 2017).

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**References**

