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## Plasticity Brain Centers

Concussions, or mild traumatic brain injuries (mTBI), affect millions of people a year. Concussions can cause physical, cognitive, visual, emotional, and sleep-related disturbances. Symptoms associated with concussions include trouble focusing, fatigue, headache, dizziness, nausea, vomiting, gait disturbance, and photophobia, with some symptoms arising from autonomic dysfunction (also known as dysautonomia). When the symptoms associated with concussion last more than three months, the condition becomes characterized as post-concussive syndrome.

The autonomic nervous system (ANS) controls involuntary functions of the body, such as blood vessel diameter, blood pressure, pupillary dilation, gut motility, sweat glands, adrenal glands, bladder function, and thermoregulation. The sympathetic and parasympathetic ANS control different functions. While the parasympathetic ANS is the “rest and digest” system, the sympathetic ANS is the “fight or flight” system. The sympathetic ANS creates a whole body response that releases epinephrine and norepinephrine from the adrenal medulla, as well as constriction of the blood vessels that results in higher blood pressure. The parasympathetic ANS, in comparison, lowers the heart rate, which helps to conserve energy while resting.

Autonomic dysfunction occurs when the sympathetic ANS overwhelms the parasympathetic ANS, resulting in high or low blood pressure, light sensitivity, constipation or diarrhea, hyperhidrosis, cold extremities, or the inability to tolerate heat or cold.

The increase of sympathetic activity associated with brain injury can lead to a decreased immune system, resulting in an increased susceptibility to other illnesses. Endocrine or hormonal abnormalities may happen due to issues with the hypothalamic-pituitary axis, which can result in women experiencing irregular menstrual cycles. There has been a noted correlation between autonomic dysfunction and irritable bowel syndrome, as well as a correlation with depression—a common symptom associated with post-concussive syndrome.

The best way to determine if autonomic dysfunction is present after a concussion is by monitoring heart rate and looking for variability, arterial pulse wave analysis, graded exercise testing, and pupillary dynamics. Here at [Plasticity Brain Centers](#) we also look at orthostatic tolerance in relation to heart rate and blood pressure.

It's also important to correctly differentiate the subtypes of post-concussive disorder. You can read about the different types of post-concussive disorder in our past blog [here](#). For more information, or to schedule an appointment with one of our functional neurologists, please [contact us today](#).