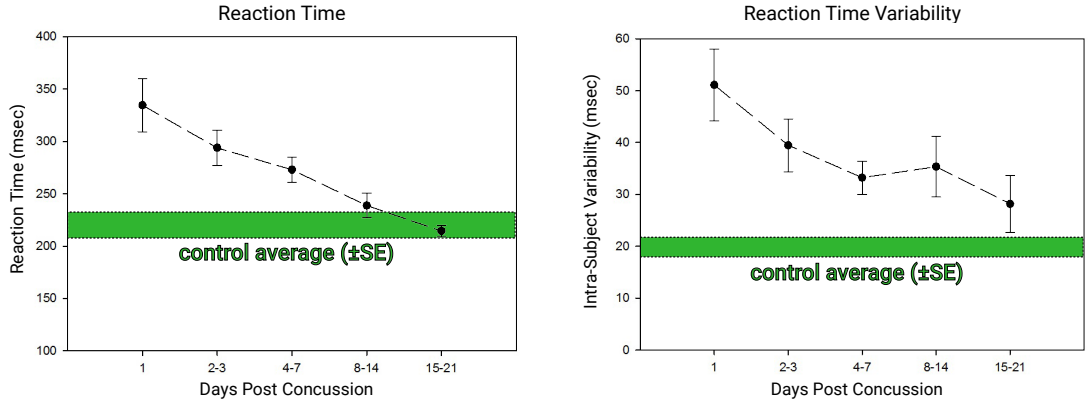
HOW DOES THE BRAIN GAUGE MEASURE UP TO OTHER METHODS?

The Brain Gauge offers several advantages for assessing concussed individuals. First, unlike any other commercially available system, **baselines are not needed**. A study was recently completed in which 200+ student athletes were tracked post-concussion with the Brain Gauge and with other methods including ImPACT and balance testing.

SUMMARIZED HIGHLIGHTS OF THE BRAIN GAUGE RESULTS:

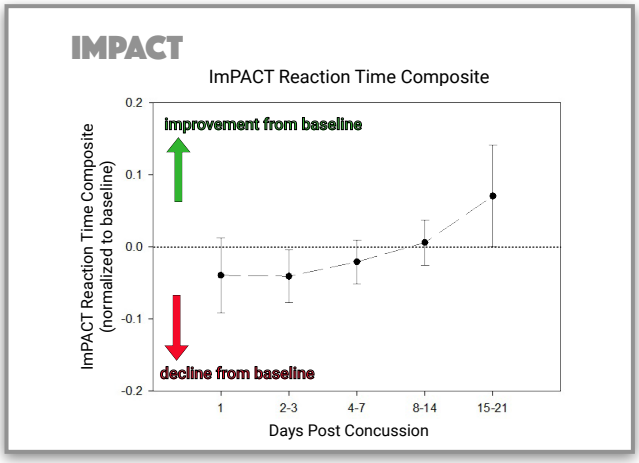
Data was collected from multiple college sports programs. All used the same equipment (the Brain Gauge) and the same battery of tests on student athletes post-concussion: reaction time, amplitude discrimination (sequential and simultaneous), temporal order judgement, and duration discrimination. The graphs below show the time course of reaction time and reaction time variability post-concussion.

BRAIN GAUGE



The average reaction time remained significantly above control values for days 1-14, as did reaction time variability for days 1-21 (graphs show mean ± standard error).

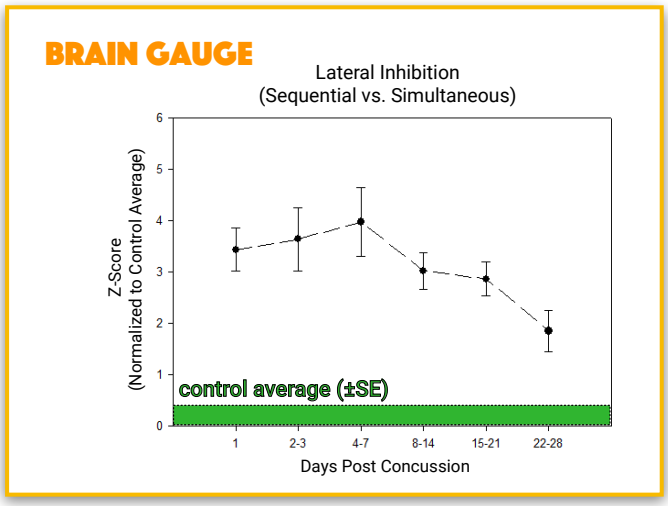
IMPACT



The graph to the left shows the same subjects' performance on the reaction time portion of the ImPACT Test. Even at day one post-concussion, the separation between baseline is not clear, especially compared to the reaction time results obtained using the Brain Gauge System. The lack of resolution makes it much more difficult to assess a subject's concussion and their progression towards recovery. For this population, there was not a statistically significant difference between baseline and any of the time points measured using the ImPACT reaction time measure.

This can be attributed to the accuracy of the Brain Gauge, which has precision of 0.33 msec –approximately 1000x more accurate than the visual RT methods used by most other tests. For this reason, the Brain Gauge is also able to collect reaction time variability, which typically is not reported by alternative methods. Reaction time variability stays well above control levels much longer than reaction time values (compare Brain Gauge reaction time vs reaction time variability plots above), indicating higher sensitivity than reaction time (in preparation for publication).

The real strength of the Brain Gauge lies in the metrics obtained that relate to building blocks of information processing (and consequently, higher cognitive function). Here, we compare one of those metrics with measures that relate to higher cognitive function (in preparation for publication).

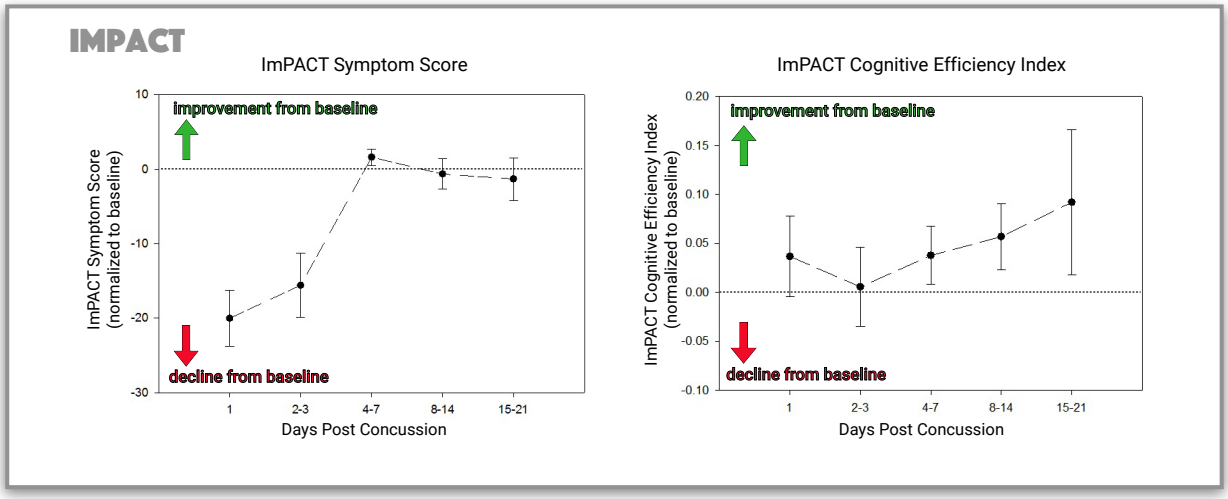


One measure that the Brain Gauge obtains is a metric related to lateral inhibition (expanded on separate handout). This is derived from a ratio of the scores from two cortical metrics tasks (amplitude discrimination delivered sequentially vs. simultaneously). Concussed individuals had a ratio over double that of controls (plotted in the graph at left). The time course of this measure is also of interest, peaking during the 4-7 day time window, and showing incomplete recovery across the 28 day testing window.

By relying on a comparison of two scores *measured during the same testing session*, baseline values are not needed to assess whether an individual is concussed. The long-lasting effects of concussion are well known, and it appears that this metric is sensitive to the long recovery period. This timescale raises the question: At what point is it safe to have another concussion? This is currently being investigated in our parallel animal research.

HOW DOES BRAIN GAUGE COMPARE TO OTHER METHODS?

On average, individuals scored **15% better** than baseline on balance tests one day post-concussion. ImPACT measures for the same subject group are shown below.



The ImPACT CEI (Cognitive Efficiency Index) actually showed improvement after concussion compared to baseline scores. In other words, the majority of student athletes tested in this study performed better after concussion than prior to injury.

The ImPACT total symptom score showed sensitivity during the first three days post-concussion. The score did not significantly deviate from baseline after this initial period.

STATISTICAL SIGNIFICANCE

The Brain Gauge scores, such as the ones described above, demonstrate independent statistical significance on six of eight tests with p values <0.001. The final composite score (generated from the z score of each metric) has a p value <<0.001.