Recovery reversal seen in Oregon study of returning concussed athletes

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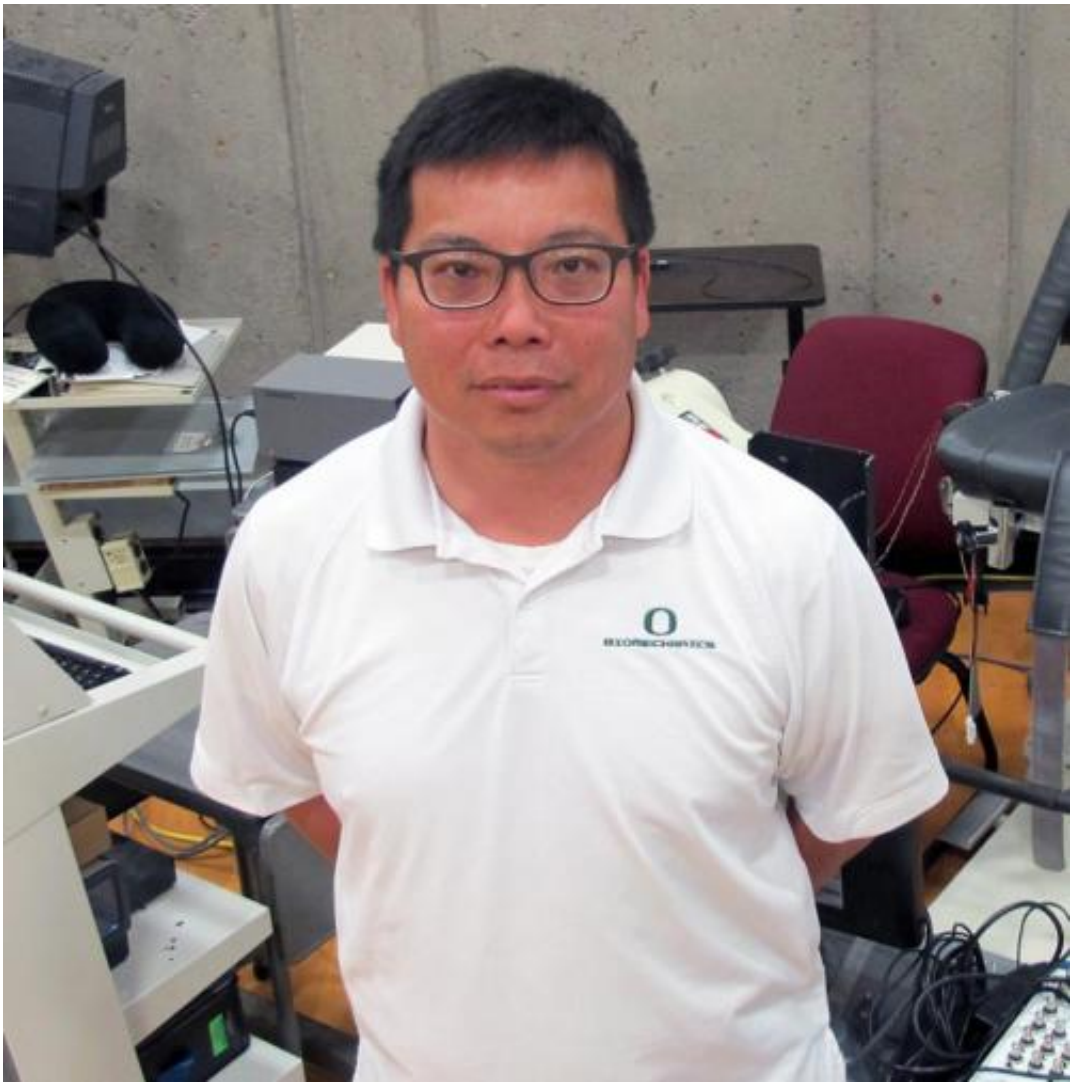

Li-Shan Chou, a professor of human physiology, directed research that measured the gait and cognitive skills, separately and combined, to study the impacts of concussions on high school athletes. While athletes showed recovery initially, many who returned to action in less than a month showed a regression in their

abilities to dual task. Credit: University of Oregon

When are athletes who have suffered concussions ready to return to action? A new University of Oregon study has found that high school athletes who head back on the field with medical clearance within 60 days experience a significant regression in their abilities to simultaneously walk and do simple mental tasks.

The regression, as seen in changes in their balance and/or altered walking speed, was found in 12 of 19 athletes. Ten of the 12 had returned to activity in less than a month. Seven athletes, who performed similarly to uninjured control subjects, had returned to action more than 20 days after their injuries. The athletes included 13 from football, four from soccer and one each from wrestling and volleyball.

The findings, published with the results presented more generally, were placed online ahead of print in the journal *Medicine & Science in Sports & Exercise*. The conclusions emerged after a closer examination of data detailed in an earlier study in the same journal in 2013. That study showed that 25 concussed high-school athletes had compromised abilities to focus and switch tasks for up to two months after their injuries. Assessments were done within 72 hours of injury and one week, two weeks, a month and two months later. Six of the athletes did not return to action in the study period and were excluded in the new analysis.

In the course of the original research, the athletes reported on when they had been cleared to resume practicing. At 28 days post injury, data suggesting a regression began to emerge, said principal investigator Li-Shan Chou, a professor in the UO Department of Human Physiology and director of the Motion Analysis Laboratory.

"We had seen this same type of curve in an earlier study of college athletes," he said. "We didn't have any evidence linking it to a return to activity, but we did discuss that possibility, because we knew that they usually were permitted to return to practice two weeks after a concussion ."

The current practice for allowing most athletes to return to activity is mostly based on self-reports of symptoms and individual assessments of cognition or motor function.

For the new analysis, lead author David Howell, who received a doctoral degree at the UO in June and is now at Boston Children's Hospital, confirmed with medical staff and team trainers when the athletes had returned to activity. He focused on these athletes' individual data, comparing their return-to-activity status with the results of three tests: simply walking; separately doing simple computerized mental exercises; and a combination in which they walked and performed mental exercises simultaneously.

"There had been a continuous improvement prior to the athletes' return to activity," Chou said. "But at the data point taken after their return to activity, we saw a turn in their recovery in the opposite direction. When the athletes did a simple walking test, there was no regression. Just using the computer task to probe their cognitive functioning, we didn't see a regression. However, put together, we did."

In the dual task exercise, the athletes, while walking, heard a spoken word and identified whether it was delivered in a low- or high-pitched tone. In other variations, the subjects' were told, as they began walking, to recite months backward from October or subtract 7 repeatedly, beginning from 100.

The more complex a secondary task the greater the effect on a

concussed individual than a non-injured control subject, Chou said. The earlier published study had found slowed reaction time of 30 to 40 milliseconds among concussed athletes two months after injury. "For many of us, that is just a blink of the eyes, but for athletes to be sure their bodily position is ready to perform a very skillful avoidance maneuver or prepare to safely take a collision, 30 milliseconds is a critical length of time for assuming that posture," he said.

Control subjects were healthy individuals of the same sex, body size, age and sport of the injured athletes. The research focused on frontal regions of the brain responsible for working, or short-term, memory and executive function.

Provided by University of Oregon