CHICAGO SUN-TIMES

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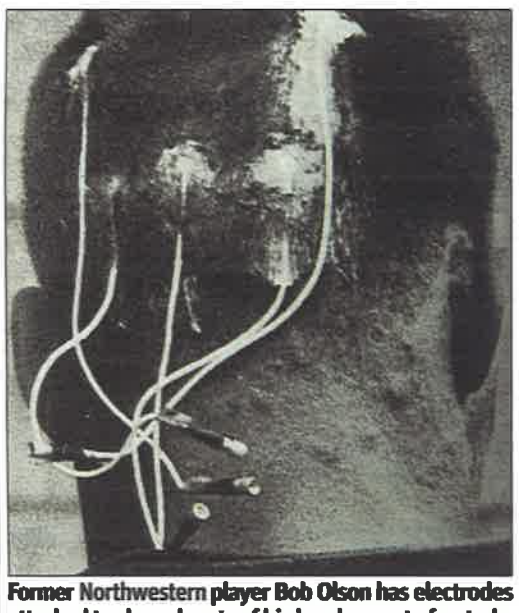


Former Northwestern player Bob Olson has electrodes attached to shaved parts of his head as part of a study of head injuries in football. | CHICAGO TODAY PHOTO

THE STUDY TOO FAR AHEAD OF ITS TIME

THE TEAM
PART 3

In 1970, Northwestern team doctor Stephen Reid Sr. developed a way to measure the effect of blows to the head on a football player. Unfortunately, no one was paying attention then. They are now.

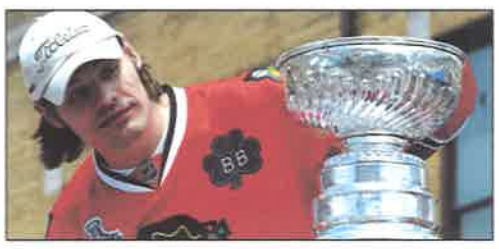
BY RICK TELANDER, PAGES 20-21

CHICAGO'S HIDDEN HEROIN CRISIS

More people in Chicago and its suburbs are going to hospital emergency rooms for heroin treatment than in any other major city in the country, a study shows

MONIFA THOMAS REPORTS ON PAGE 2

Retired Chicago Police Officer John Roberts lost his 19-year-old son Billy to a heroin overdose last year. Roberts says many parents aren't aware of how available heroin is to their children. "Their kids can try heroin for $10, and if they're lucky, they never try it again."
JOHN PATSCH~HERALD-NEWS



HAWKS PRIDE

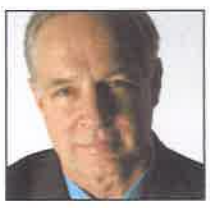
STANLEY TAKES ANOTHER VICTORY LAP — THIS TIME AT PRIDE PARADE

PAGE 3

'YOU KNOW, WE HAD THE ONLY PLAYER EVER WHO WAS RECORDED WHILE GETTING A CONCUSSION.'

THE TEAM

PART 3



In this series, Rick Telander catches up with former teammates who describe how football helped them in their lives, but also how injuries suffered 40 years ago haunt them today.

by RICK TELANDER

Dr. Stephen E. Reid Jr. remembers what it was like high up in the Northwestern press box at Dyche Stadium when he was helping his dad, Dr. Stephen E. Reid Sr., with his brain-injury project.

"There were a few of us in there, and we had a camera filming each play and voice commentary, and there was a graph that was getting signals from the player who was wearing the wired helmet, and printouts were coming out . . . and it all would be matched up by one of us writing down, 'Play No. 1,' 'Play No. 2,' and so on."

Reid Jr., 62, is now a surgeon at Richland Memorial Hospital in Olney, Ill., 250 miles south of Chicago. But when he was a pre-med student at Northwestern, he would assist his dad in a study that was so far ahead of its time it went virtually unnoticed by those who should have been most concerned — football players and their families.

We are sitting in Reid Jr.'s kitchen at his quiet and stately home deep in the country, a lake somewhere off in yonder trees, eating Italian beef sandwiches his wife made for us. Reid Jr. has finished his meal and, with border collies Jennie and Tipper at his feet, studies the book he co-wrote with his father in 1984. Its title is *Head and Neck Injuries in Sports*. Reid Jr. hasn't looked at it in some time. To say it's not light reading is an understatement. The 200 pages are full of complex charts and graphs and chapters such as "Analysis of Telemetry Data."

I'm not much of a scientist, but I read the book nonstop. The reason? My friends and teammates are contained within.

"I helped Dad after school [Reid went to Evanston High School] and while I was in residency," he says. "But my dad was the power pack in the thing. We both wrote, but he was the main force. He put an enormous amount of time into the study. And he didn't get paid at all. I'm not sure he ever got the credit he deserved."

I can guarantee you he didn't. Reid Sr. died last fall at 94, and though his 20-year brain-trauma study eventually was nominated for a Nobel Prize in medicine, the former Northwestern All-America guard in the 1930s and Leo High School grad from the South Side was quiet, modest and in it for the love of the game and the improvements he might be able to bring. He had, after all, been a two-way player — an offensive and defensive guard — on the Wildcats' Rose Bowl-champion team in 1949. As a sophomore, he had broken his nose so badly that he became the first player in the Big Ten to wear a facemask.

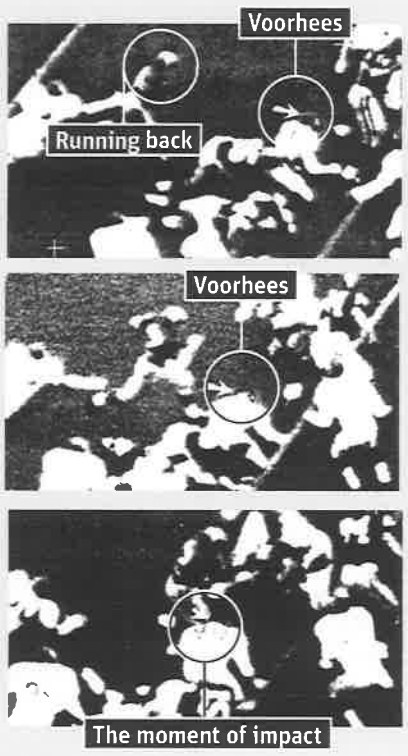
"Ol' Doc Reid," as we called him, was the doctor for Northwestern's football team from 1951 to 1984, and I remember him as a kindly, curious, unassuming man who always had a pipe clenched between his teeth.

To measure and record the brain waves of a human being during a violent game isn't an

Dr. Stephen Reid Jr. helped his father, Dr. Stephen Reid Sr. (top), conduct his study *Head and Neck Injuries in Sports*, which was nominated for the Nobel Prize in medicine.
RICK TELANDER~SUN-TIMES

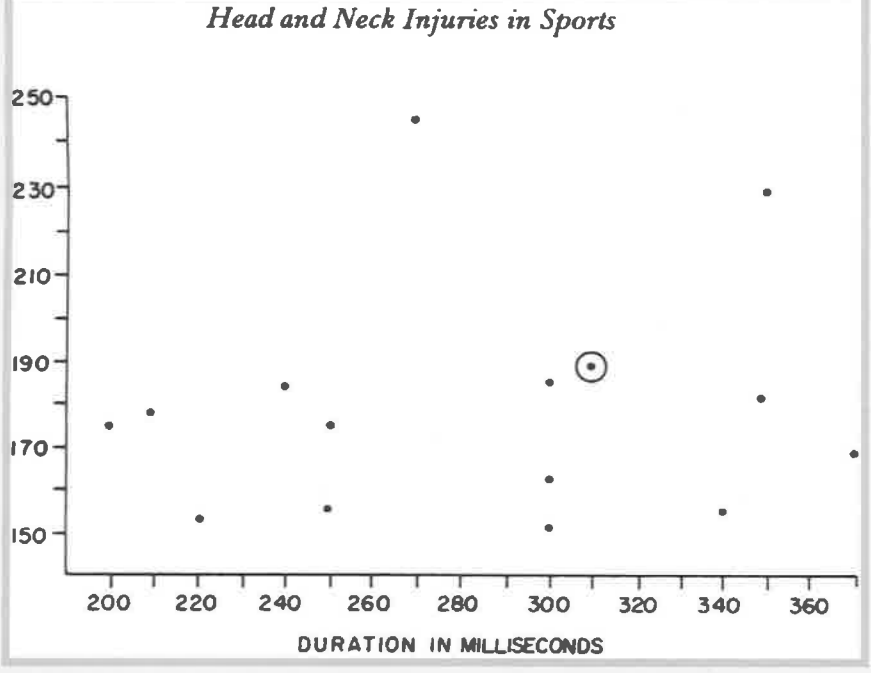
THE HIT THAT CAUSED THE CONCUSSION

In the top frame, the Indiana running back starts into the hole as Northwestern defender **John Voorhees** spins out of a block. In the middle frame, the running back closes in on Voorhees, who doesn't see him coming. In the final frame, you see the moment of impact when the running back's knee slams into the helmet of an unsuspecting Voorhees. Even though this hit wasn't as severe as others Voorhees suffered during the course of the season, it did cause a concussion, likely because Voorhees wasn't expecting the impact and therefore did nothing to brace for the hit.



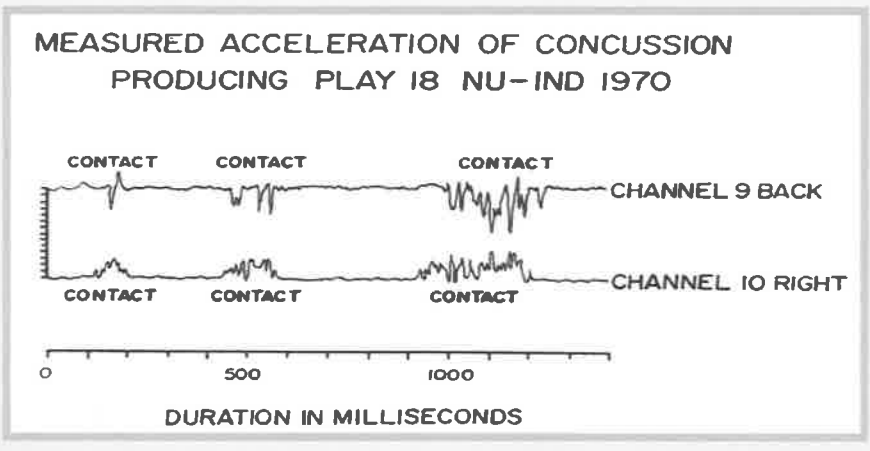
VOORHEES' BIGGEST IMPACTS IN 1970

From Page 60 of Stephen Reid Sr.'s study *Head and Neck Injuries in Sports*, the circled hit produced the concussion that Voorhees suffered. Notice, however, that two other hits were more powerful.



VOORHEES' BRAIN ACTIVITY BEFORE AND AFTER THE CONCUSSION

The level of activity in the right part of his brain is lower shortly after the concussion. "There is a unilateral decrease in amplitude on the right side of the brain, which persisted," the study says.



easy thing to do, especially when it never has been done before. Reid Sr. asked for and received help from NASA in developing a contraption that involved a ground wire and four electrodes that recorded gravitational forces in three directions and that had to be glued to the player's head and hooked to a bulbous protrusion at the back of his helmet. It then sent out signals to the EEG receiver in the press box — without frying the player, detonating in collisions or calling Mars.

Only one player, the one who would have the most head hits, wore the electronic mess each season. Reid Sr. had discovered from early trial and error that the player always was going to be the middle linebacker. Some of the measured hits were astounding.

"Our goal . . . was to obtain vital, but previously unavailable, information regarding the tolerance of the human brain to impact," Reid Sr. said in the book.

Reid Jr. looks up from his reading.

"You know," he says, "we had the only player ever who was recorded while getting a concussion."

I did know that. In the book, there are 11 pages and numerous charts describing the case of the unnamed "instrumented player." But I knew it was John Voorhees.

I was on the field when it happened. It was Nov. 14, 1970, at Indiana. I was playing right cornerback, and I moved up when I read run and saw the Indiana tailback slicing off our right tackle. Middle linebacker Voorhees — my best friend on the team and a fellow Peorian who lived with me and a bunch of other guys off campus — spun out of a double team, staying low and balanced, as he should have, moving directly into the hole.

Voorhees was such an instinctive and brilliant defender — he would be named Academic All-Big Ten that season and would be voted Northwestern's most valuable player the next season — that he knew what plays an offense was running simply by the way linemen tried to block. Thus, he was in perfect position to make the tackle on a ball carrier he knew was coming toward him. He just didn't know how close the runner was.

The runner's knee slammed into the left front of Voorhees' helmet, and both men went down. The ball carrier limped back to the huddle, but Voorhees stayed down for a moment before getting up on his hands and knees. Most of the defense was near him now, and, as I recall, Voorhees slowly and intently searched in the blades of grass for his mouthpiece. The thing was, we were playing on artificial turf and he hadn't been wearing a mouthpiece.

The graph in the book shows Voorhees received a blow of 188 G's on that tackle — or 188 times the gravity of the earth — meaning a 220-pound man would weigh 20.7 tons for almost a third of a second.

There are a number of interesting things here. One is that Voorhees received several blows during the 1970 season that were harder than this (one was 247 G's) and a couple that were of longer duration, but none of them caused him a concussion. Another is that the momentum from his own head, as he spun out of the double team, exerted, according to the Reids' book, "counterforce" that increased "the resistance to the knee blow," a slingshot effect that didn't occur in any of his other major hits.

The graph showed the area of damage, curiously, was on the right side of his brain, away from the hit. But that, as is well-known now, is from the pliable brain being slammed by initial force against the opposite side of the rigid skull.

Voorhees had taken three high-impact head blows earlier in the Indiana game — after which he felt "fuzzy mentally," according to the book — that didn't register much change in his EEG. Then came four more high-intensity blows in succession before the concussion, leading the Reids to write, "Without doubt, the cumulative effect" of these earlier blows likely contributed to the injury that occurred on the last.

Finally — and perhaps most important — Voorhees didn't know the knee was coming and didn't prepare for it. By using the neck and body to absorb blows they anticipate — "segmental reflex" — football players protect their brains from forces that otherwise would be devastating. Blind-side or surprise hits, the Reids factually had determined, are the worst.

And one last thing: Football hits are quite complex. They aren't hammers hitting steel. Collisions, the Reids interpreted from their machine, often consist of "multiple mini-impacts" occurring during what looks like a single blow.

I had shown the book to Dr. Ann McKee, the Boston University brain-trauma researcher, when I visited her lab at the New England Veterans Administration Center a few days earlier.

"Very, very interesting," she had said, scanning its pages, reading pertinent parts.

She nodded with approval.

"What he didn't show here, though, is that there is long-term damage, that there is a long latent stage if you have CTE [chronic traumatic encephalopathy]," she said. "Like cigarettes, it can take 20 years or more."

The Reids couldn't show that because they worked only on live brains and wouldn't have known what to look for more than a quarter-century ago, when the connections between head trauma and ensuing dementia were nonexistent.

They did warn early in their book that "there is no information available on the cumulative effects on the brain to repeated, medium-intensity blows."

Nor did they know then that Reid Sr. would develop Alzheimer's disease, perhaps — though we never will know — as a result of his own football head trauma.

"It could have been misdiagnosed CTE," McKee said.

The question of the brain damage that might be caused by cumulative subconcussive hits is one that rivets researchers today. A recent Time magazine cover story about football stated some scientists now fear the many lower-impact hits players routinely receive can be as bad as, or worse than, "the dramatic head injuries that tend to receive more attention and intensive treatment."

Back to my friend Voorhees. He went to Evanston Hospital several times that week for testing, but he was cleared to play in our next game, the season finale against Michigan State. He was en route to an 11-tackle-per-game average, and we were en route to a second-place finish in the Big Ten. No stopping any of us.

I made a note to myself to visit Voorhees and ask him about all this. He's an attorney who lives in northern Wisconsin, and we often go fishing up there during the summers. It would be good to see him again.

COMING TUESDAY: PART 4

John Voorhees talks with Telander about the concussion he suffered that was recorded for Dr. Reid's head-injury study.