Wharton junior Owen Thomas (40), a six-foot-two, 240-pound defensive end, was a second-team All-Ivy player in 2009. He recorded 29 tackles and finished second in the league with six sacks.

The Daily Pennsylvanian

Wharton Junior Found Dead Monday Afternoon
By Darina Shtakhman
April 26, 2010, 8:41 pm

Wharton junior Owen Thomas was found dead at his off-campus residence around 2 p.m. Monday afternoon. University spokeswoman Lori Doyle and Director of Athletic Communication Mike Mahoney confirmed. He was a member of the football team.

Cause of death has not yet been determined, but “no foul play is suspected,” according to Doyle.

Thomas, who played defensive end for the Quakers, was recently voted a captain of the football team.

The New York Times

Suicide Reveals Signs of a Disease Seen in N.F.L.
By Alan Schwarz
September 13, 2010

ALLENTOWN, Pa. — A brain autopsy of a University of Pennsylvania football player who killed himself in April has revealed the same trauma-induced disease found in more than 20 deceased National Football League players, raising questions of how young football players may be at risk for the disease.

Owen Thomas, a popular 6-foot-2, 240-pound junior lineman for Penn with no previous history of depression, hanged himself in his off-campus apartment after what friends and family have described as a sudden and uncharacteristic emotional collapse. Doctors at Boston University subsequently received permission from the family to examine Thomas’s brain tissue and discovered early stages of chronic traumatic encephalopathy, a disease linked to depression and impulse control primarily among N.F.L. players, two of whom also committed suicide in the last 10 years.

Thomas is the youngest and first amateur football player to be found with clear C.T.E.
By Stephen Fried

Corey Calcut-Waym looks like he was born to cause concussions. A noseguard at the Haverford School, he’s a six-two, 330-pound freshman, with room to grow.

Corey is here before practice as a subject in a scientific experiment—one that’s largely unknown to a public plagued by media coverage of sports head injuries, but that’s being closely watched by experts around the world because it could revolutionize the diagnosis of concussions. He stands not on the football field, but along the carpeted bleachers for the school’s squash courts, surrounded not by coaches, but by earnest, preppy students holding clipboard and stopwatches.

One of the eager young men hands Corey a set of four laminated cards bound with a white spiral. On each card is a set of random numbers in varying positions. Corey is told to read the numbers in order, out loud, as fast as he can. “Two, five, eight, zero, seven,” he begins. His time is recorded as his baseline.

Later, during football season, if he takes a powerful blow to the head—actually, it’s more like when he takes a blow, since the average high-school player gets hit on the helmet up to 1,400 times each season—he can quickly be retested on the sideline. All the other sideline tests used to diagnose concussions involve a battery of complex questions and subjective scoring—and they often take longer than the time left in the game. This test—named the King-Devick for the pair of optometry students who developed it in 1976—takes less than a minute, and it’s pass/fail. A team manager could administer it: The athlete just reads the cards again. If he’s concussed, he won’t be able to say the numbers as quickly as before.

And the two Penn neuro-ophthalmologists testing King-Devick—Steven Galetta and Laura Balcer—are starting to draw attention for their work.

Long, loquacious, contagiously affable Galetta, 54, and his energetically serious 46-year-old colleague Balcer are two of the hard-hitting world of concussions, and surprisingly engaging. Neuro-ophthalmologists are considered the doyens of neuroscience, Galetta explains: “We’re like the Rodney Dangerfields of the brain, no respect.” He views the new field of sports concussion research he’s entered as dominated by “expert opinion, the lowest form of medical evidence.”

Laura Balcer is Steve Galetta’s resident at HUP (where, among other jobs, he runs the neurology residency program) and now in the department as his protégée. Kristin Galetta—daughter of Steve—is a medical student at Penn and was lead author on both papers in the King-Devick research.

A big part of the reason the research has been done at Penn and the Haverford School is that Galetta played on a football team at Penn, and is a longtime adviser to the university’s athletic program.

Because of their nerdy interest in an old eye test, Galetta and Balcer find themselves in the midst of an incredibly important public health debate—one that will determine how, and if, many youth and professional sports are played in the future. Already, big changes are going into effect. This summer, the Ivy League Concussion Committee—for which Galetta and Balcer were chosen as neurology consultants—ordered its football teams to cut full-contact practices from four a week to two, in hopes of reducing head impacts. Several days later, the NFL announced it was limiting full-contact practices to one a week.
I’m sitting in Steve Galetta’s office on the fourth floor of the Gates Building in the labyrinthine HUP complex, talking head trauma with him and Laura Balcer. While Balcer sits quite properly, Galetta slouches in his desk chair, playing absentmindedly with a hard rubber brain.

The results of their King–Devick studies, they say, are still very preliminary. But these two understand something that a lot of people in the concussion world tend to overlook—none of the tests team doctors and athletic trainers have been using for the past decade have been well-studied. The tests are better than nothing, but nobody knows how much better. It’s still unclear how many less obvious concussions they miss.
Revised Operating Characteristics
Estimated from the Confidence Intervals

Sensitivity = (0.54 + 0.97)/2 = 0.76
Specificity = (0.98 + 1.00)/2 = 0.99
EP550 Homework Assignment 1
Using the King-Devick Test to Evaluate High School and College Football Players for Concussion

Background
Recent developments have established that high school and college football players are at risk for chronic traumatic encephalopathy, which can have devastating consequences. Most observers believe that recognizing concussion is an important step in preventing chronic traumatic encephalopathy. Traditional methods for recognizing concussion have not been studied enough to establish effectiveness, and most take more time than is practical during game conditions. The King-Devick test is short enough to be used during game conditions and has been studied in over 200 college athletes. (1)

Problem
Assume that the sensitivity of the King-Devick test is 0.76 and the specificity is 0.99. Also assume that when trainers suspect a football player might have had a concussion, half of the players eventually have a concussion confirmed and half have a concussion ruled out during a subsequent evaluation by a neurologist that includes specialized testing. Finally, assume that trainers use the King-Devick test to examine players during a game who they suspect might have had a concussion and then refer all these players to a neurologist for further evaluation.

1. What is the probability that a football player will eventually have a concussion confirmed if the King-Devick test result is positive?
2. What is the probability that a football player will eventually have a concussion ruled out if the King-Devick test result is negative?

Use all 5 methods described in the first lecture to answer these questions. The 5 methods are the 2by2-table method, the Bayes’ Theorem method, and the 3 methods that use the likelihood ratio (LR), which are the traditional method, Henry’s modification of the traditional method, and the method using a nomogram.

Use 4 decimal places for the answers. (In general, use 4 decimal places in this course for describing answers to questions on homework assignments, quizzes, and examinations, unless there is a good reason for using more or fewer decimal places. Recognize that 4 decimal places in a probability, for example, 0.1234, is the same precision as 2 decimal places in a percentage, for example, 12.34%.)

Reference