the injured brain, the injured mind.

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Part 2
110
N.F.L. Brains
A neuropathologist has examined the brains of 111 N.F.L. players — and 110 were found to have C.T.E., the degenerative disease linked to repeated blows to the head.
44
Linemen

Daniel Colchico
Tom Keating
Mike Pyle
Gerry Huth
Joe O’Malley
Pete Duranko
Tom Mchale
John Wilbur
Dr. McKee found the disease at a level similar to that found in Seau’s brain, and it was in the region of the brain that is consistent with the symptoms he was exhibiting.

Sash’s mother, Barnetta Sash, said: “Now it makes sense. The part of the brain that controls impulses, decision-making and reasoning was damaged badly.”
"One of the problems with CTE cases is that some of them end in suicide. The suicides are often precipitous, without warning," said neurosurgeon Julian Bailes, a co-author of the report and co-director of the NorthShore Neurological Institute in Evanston, Ill.

Gary Mihoces, USA TODAY Sports
Officially, Seau never suffered a concussion during a two-decade career with the San Diego Chargers, Miami Dolphins and New England Patriots that ended with his 2009 retirement. But Walczak, a former tight end and long snapper in the NFL, believes his friend suffered multiple undiagnosed concussions. "Junior just didn't report head injuries," Walczak said. "I had (unreported) concussions, too, especially back when guys were allowed to tee off on the long snappers. But you just don't report them. You're a football player. You're tough. If you did report stuff like that, next thing you know you're on waivers."
Word came Thursday that Seau had a degenerative brain disease when he shot himself in the chest last May. Most shocking was that it was hardly a shock at all. His is merely the latest of dozens of cases of former pro football players who died with signs of chronic traumatic encephalopathy (CTE) and the third by suicide in recent times.

"On initial examination the brain looked normal but under the microscope, with the use of special staining techniques, abnormalities were found that were consistent" with a form of CTE, NIH said in a statement. It added that a small region of Seau's left frontal lobe showed scarring consistent with a small, old, traumatic brain injury.

Erik Brady and Gary Mihoces, USA TODAY Sports
Wrestling
Chris Benoit

Ice Hockey
Reggie Fleming
Bob Probert
Repeatedly heading a soccer ball exacts a toll on an athlete's brain.

“Women report more severe symptoms and longer recovery times than men following brain injuries in sports.”
The study authors found that female amateur soccer players who frequently head balls showed more white matter brain alterations than their male counterparts. The study included 49 women and 49 men, ages 18 to 50, and examined MRI imaging of players' brains. Each female player was compared to a male player of a similar age and with other similar characteristics including frequency of heading exposure.
MRI-defined White Matter Microstructural Alteration Associated with Soccer Heading Is More Extensive in Women than Men

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From the Gruss Magnetic Resonance Research Center, Department of Radiology (T.G.R., R.F., L.E.H., N.L., M.L.L.), Departments of Epidemiology and Population Health (M.K., R.B.L.), Neurology (R.B.L.), and Psychiatry and Behavioral Sciences (M.L.L.), and the Dominick P. Purpura Department of Neuroscience (T.G.R., M.L.L.), Albert Einstein College of Medicine, 1300 Morris Park Ave, Bronx, NY 10461; Departments of Radiology (M.L.L.) and Neurology (R.B.L.), Montefiore Medical Center, Bronx, NY; Department of Pediatrics, Johns Hopkins University, Baltimore, Md (E.C.); and Sutter Health, Walnut Creek, Calif (W.F.S.). Received January 29, 2018; revision requested April 13; final revision received May 2; accepted May 22. Address correspondence to M.L.L. (e-mail: michael.lipton@einstein.yu.edu).

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*T.G.R. and E.C. contributed equally to this work.

Conflicts of interest are listed at the end of this article.

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**Purpose:** To examine the role of sex in abnormal white matter microstructure after soccer heading as identified by using the diffusion-tensor imaging (DTI) metric fractional anisotropy (FA).

**Materials and Methods:** In this prospective cross-sectional study, 98 individuals who were enrolled in a larger prospective study of amateur soccer players (from 2013 to 2016) were matched 1:1 for age and history of soccer heading in the prior 12 months. Among the subjects, 49 men (mean age, 25.7 years; range, 18–50 years) and 49 women (mean age, 25.8 years; range, 18–50 years) were selected.
Figure 2: A, B, Three-dimensional semitransparent images of the Johns Hopkins University template brain oriented facing the right hemisphere in, A, male, and, B, female soccer players demonstrate that lower fractional anisotropy (FA) is associated with heading more extensively in women than in men. Fewer regions of significant association of FA with heading are detected in men than in women. C, Image shows that significant differences in association of heading and FA between men and women are predominantly co-located with areas where women, but not men, show significant association of heading and FA.
One should look at the sub-concussive injuries.
The injuries that the athlete does not think is a problem.
It is those injuries which might have long term problems!

https://www.npr.org/sections/health-shots/2018/07/31/634263471/heading-may-be-riskier-for-women-soccer-players-than-men
Marine Gunnery Sgt. Aaron Tan (Rt.)

"Lying in bed, I was right there in the blast zone. I got blown up. And at this medical study—nobody even thought that they [blast arenas] were very harmful, and so we didn’t try them, which is a waste because all those things are curable to the body. On a positive note for me, I wouldn’t probably be in this publication. I’m not going to let this stop me from living a good life."

Photographed by Tanya Powell and Michael Kiefer

Marine Gunnery Sgt. Tiffany K. Lucas (L.)

"Tiffany, on the other hand, was ‘born-again’ while helping women in a remote Afghan village earn additional income for their families. Memory, balance difficulties, and anxiety are among her many symptoms. This tattooed eye and scarred face are common symbols used by landmine-affected soldiers.

Photographed by Michael Kiefer and Tanya Powell

FLORIDA
PRICE TAG FOR A WARMING PLANET

HEALING OUR SOLDIERS
Unlocking the Secrets of Traumatic Brain Injury

Exploring the Hidden Culture in Hawaii
The Small Strange Lives of Mites

February 2015

https://www.nationalgeographic.com/healing-soldiers/blast-force.html
Blast Force

The Invisible War on the Brain

Brain trauma from blast force is the signature injury of the Iraq and Afghanistan campaigns, afflicting hundreds of thousands of U.S. combat personnel. Although unseen, the damage strikes deeply into a soldier’s mind and psyche.
Marines on patrol in Afghanistan in 2009 noticed a motorcyclist pass by, and moments later an IED exploded. “It’s like being kicked by a horse, a horse with a foot that could cover your entire body,” said one survivor of an IED attack. PETER VAN AGTMAEL, MAGNUM PHOTOS
The shock wave from a distant explosion “felt like it lifted my innards and put them back down.”

—Kevin Parker
Blast in the Brain

Studies show that the key mechanical factors associated with brain injury are an increase in intracranial pressure and the brain’s motion relative to the skull. The blast wave, or overpressure, affects the brain immediately upon impact with the skull. Pressure in the brain returns to normal after only a few milliseconds, but brain motion can occur for hundreds of milliseconds after impact.
The Sabres' Jason Pominville was concussed after a blindside hit against the glass on Oct. 11. A Mayo Clinic conference will discuss steps to prevent such injuries.

By JEFF Z. KLEIN
Published: October 17, 2010

PET Scan May Reveal C.T.E. Signs, Study Says

The New York Times

For years, researchers have had to use tissue obtained posthumously to diagnose chronic traumatic encephalopathy, or C.T.E., the degenerative brain disease that has bedeviled athletes, soldiers and others who have sustained repeated head hits and concussions.

Retired players was consistent with those found in the autopsies of players who had C.T.E.

But the size of the group was tiny. Far larger and more in-depth studies will be needed before PET scans may be used to identify the tau pathology in patients who are not already experiencing cognitive problems. Some doctors also questioned the accuracy of the dye used to identify tau deposits in the brain.

It may take years and perhaps decades for doctors to determine how much of a role head hits and brain trauma have in patients with C.T.E., as opposed to genetic predisposition and health maladies like heart disease.

But the study is a first step toward the possibility of using PET scans to develop strategies to prevent the onset of the disease and provide treatment for those who have it.
what about one season of contact sports in college?

Cognitive effects of one season of head impacts in a cohort of collegiate contact sport athletes

Conclusion:
Repetitive head impacts over the course of a single season may negatively impact learning in some collegiate athletes. Further work is needed to assess whether such effects are short term or persistent.

Neurology 2012;78:1777–1784
Game change: Brain scans offer new view of NFL concussions
Blood test shows promise in diagnosing concussions

Findings could open doors to better diagnoses

http://www.startribune.com/lifestyle/health/285036241.html
Blood Test for Concussion Symptoms?

Serum SNTF Increases in Concussed Professional Ice Hockey Players
And Relates to the Severity of Post-Concussion Symptoms

Robert Siman, PhD, Pashtun Shahim, MD*, Yelverton Tegner, MD**, Kaj Blennow, MD PhD*,
Henrik Zetterberg, MD PhD##, Douglas H. Smith, MD
Figure 1. Sustained increase in serum SNTF concentrations in professional ice hockey players after concussion but not concussion-free training. SNTF levels were measured in serum during the preseason (n=45) or serially after an in game concussion (n=28), or before and after a training game (n=17). The mean serum SNTF levels (+/- S.E.M.) were elevated at 1, 12, 36, and 144 hours post-concussion compared with the mean preseason baseline concentration, and the increases at the latter three time points were statistically significant (two-tailed t-test; *p<0.03; **p<0.002). At the time of return to play (RTP) after a period of rest, SNTF levels returned to their preseason baseline. In contrast to the pronounced effects of concussion, SNTF was unchanged 1 or 12 hours after concussion-free training (p>0.87).
Evidence that the blood biomarker SNTF predicts brain imaging changes and persistent cognitive dysfunction in mild TBI patients

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Although mild traumatic brain injury (mTBI), or concussion, is not typically associated with abnormalities on computed tomography (CT), it nevertheless causes persistent cognitive dysfunction for many patients. Consequently, new prognostic methods for mTBI are needed to identify at risk cases, especially at an early and potentially treatable stage. Here, we quantified plasma levels of the neurodegeneration biomarker calcitonin gene-related polypeptide N-terminal fragment (SNTF) from 38 participants with CT-negative mTBI, orthopedic injury (OI), and normal uninjured controls (UCs) (age range 12-30 years), and compared them with findings from diffusion tensor imaging (DTI) and long-term cognitive assessment. SNTF levels were at least twice the lower limit of detection in 7 of 17 mTBI cases and in 3 of 13 OI cases, but in none of the UCs. An elevation in plasma SNTF corresponded with significant differences in fractional anisotropy and the apparent diffusion coefficient in the corpus callosum and uncinate fasciculus measured by DTI. Furthermore, increased plasma SNTF on the day of injury correlated significantly with cognitive impairment that persisted for at least 3 months, both across all study participants and also among the mTBI cases by themselves. The elevation in plasma SNTF in the subset of OI cases, accompanied by corresponding white matter and cognitive abnormalities, raises the possibility of identifying undiagnosed cases of mTBI. These data suggest that the blood level of SNTF on the day of a CT-negative mTBI may identify a subset of patients at risk of white matter damage and persistent disability. SNTF could have prognostic and diagnostic utilities in the assessment and treatment of mTBI.

Keywords: surrogate marker, concussion, calcitonin gene-related polypeptide N-terminal fragment (SNTF), diffusion tensor imaging (DTI), white matter injury, cognitive impairment
For Ravens’ John Urschel, Playing in the N.F.L. No Longer Adds Up

The New York Times

By KEN BELSON
JULY 27, 2017

One of the N.F.L.’s smartest players did the math and decided to retire after just three years in the league.

The player, John Urschel, an offensive lineman for the Baltimore Ravens who received much publicity for his off-season pursuit of a doctorate in math at M.I.T., told the team on Thursday that he was hanging up his cleats at 26.

Urschel’s agent, Jim Iver, said Urschel was overwhelmed with interview requests but would not be speaking to the news media. On Twitter, Urschel wrote that “there is no big story here” and that the decision to retire was not an easy one to make, but “it was the right one for me.”

He added that he planned to go back to school full-time in the fall, “to take courses that are only offered in the fall semester” and spend time with his fiancée, who is expecting their first child in December.

Urschel’s decision came two days after the release of a study by researchers in Boston in which all but one of 111 brains of N.F.L. players they studied showed signs of chronic traumatic encephalopathy, a degenerative brain disease linked to repeated head hits.

The Baltimore Sun and ESPN, citing anonymous sources with the Ravens, said his retirement was related to the study.

Eugene Monroe, a fellow lineman on the Ravens that season, said he spoke with Urschel after he sustained that concussion. Urschel, he said, told him that he was unnerved that it had affected his ability to solve math problems.

“He was nervous, he was frightened about it,” said Monroe, who retired last year in part because he worries about the long-term effects of repeated head hits. “For something he loves, he’s been thinking about it. How could he not.”

Still, Monroe said he was not surprised that Urschel returned to the field three weeks after the concussion, “football ready,” as Urschel said on the HBO program, though it took him longer to recover his math skills.

“It’s a real problem beyond just the hits to the head, but also the further damage that might lead to another injury,” Monroe said. “Things happen even faster on the field.”

Despite the severity of the concussion, Urschel said that he wanted to continue doing the two things he loved: math and football.

“I recognize that this is somewhat irrational,” Urschel said on the segment. “But I am doing it.”

Not anymore.
Concussion Coach

There's an App For That
“It is no longer debatable whether or not there is a problem in football — there is a problem,” Dr. McKee said.

N.F.L. Brains 110 of 111 with CTE

By Joe Hart, Josh Williams and Sam Mandel

July 20, 2017

Dr. Ann McKee, a neuropathologist, has examined the brains of 111 deceased football players. A brief excerpt of her findings was published on Tuesday in the Journal of the American Medical Association.

Of the 111 players, 106 of them played in the N.F.L. — and 100 of these were found to have chronic traumatic encephalopathy, or CTE, the degenerative disease believed to be caused by repeated blows to the head.

CTE causes mental symptoms, including memory loss, depression and dementia. The problems can arise years after the blows to the head have stopped.

The brains below are from players who died as young as 23 and as old as 85. And they are from every position on the field — quarterbacks, running backs and linebackers, and even a place kicker and a center.

They are brain players you have never heard of and players, Van Lee Walker, who are