

2016

# HEALTH & SAFETY REPORT





AP Photo | Paul Spinelli

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## MESSAGE FROM COMMISSIONER ROGER GOODELL

**The greatest athletes in the world play football. Their ability to surprise and dazzle us with their talent—to lift our spirits—never ceases to amaze. It’s why nearly 200 million people call themselves fans of the National Football League. Because on any given game day, something incredible is going to happen.**

Part of loving the game of football is protecting the people who play it. That is why we have worked diligently to continually raise our standards around player health and safety.

Bringing together the foremost authorities in their fields, we’ve progressively expanded our understanding of concussions and brain injuries. We’ve looked for opportunities to learn valuable new lessons from data and science. And we’ve revisited and revised our rulebook to make better calls on and off the field.

While we’ve made some tremendous strides in recent years, I’m not satisfied and neither are the owners of the NFL’s 32 clubs.

In September 2016, the NFL and its owners announced the launch of *Play Smart. Play Safe.*—which, put simply, reflects a commitment to continue doing more. To drive progress in the prevention, diagnosis and treatment of head injuries. To enhance our medical protocols. And, to further improve the way the game of football is taught and played by all who love it.

It begins with a pledge of \$100 million for independent medical research and engineering advancements—building on the \$100 million that the NFL and its partners are already spending on medical and neuroscience research—and a commitment to look at anything and everything to protect our players and to try to make the game safer.

We recently announced our commitment to hire a leading physician to serve as a full-time Chief Medical Officer. The Chief Medical Officer will be based in the League office and will work with each team’s medical staff, the medical committees of the NFL and the NFL Players Association (NFLPA) as well as the broader scientific and medical communities, to help ensure that our clubs have access to the most up-to-date information, that our research funds are effectively advancing science and sports medicine and that our players and team staffs receive timely and comprehensive information on injury prevention, diagnosis and treatment.

Some changes will be apparent right away, especially on the field. New

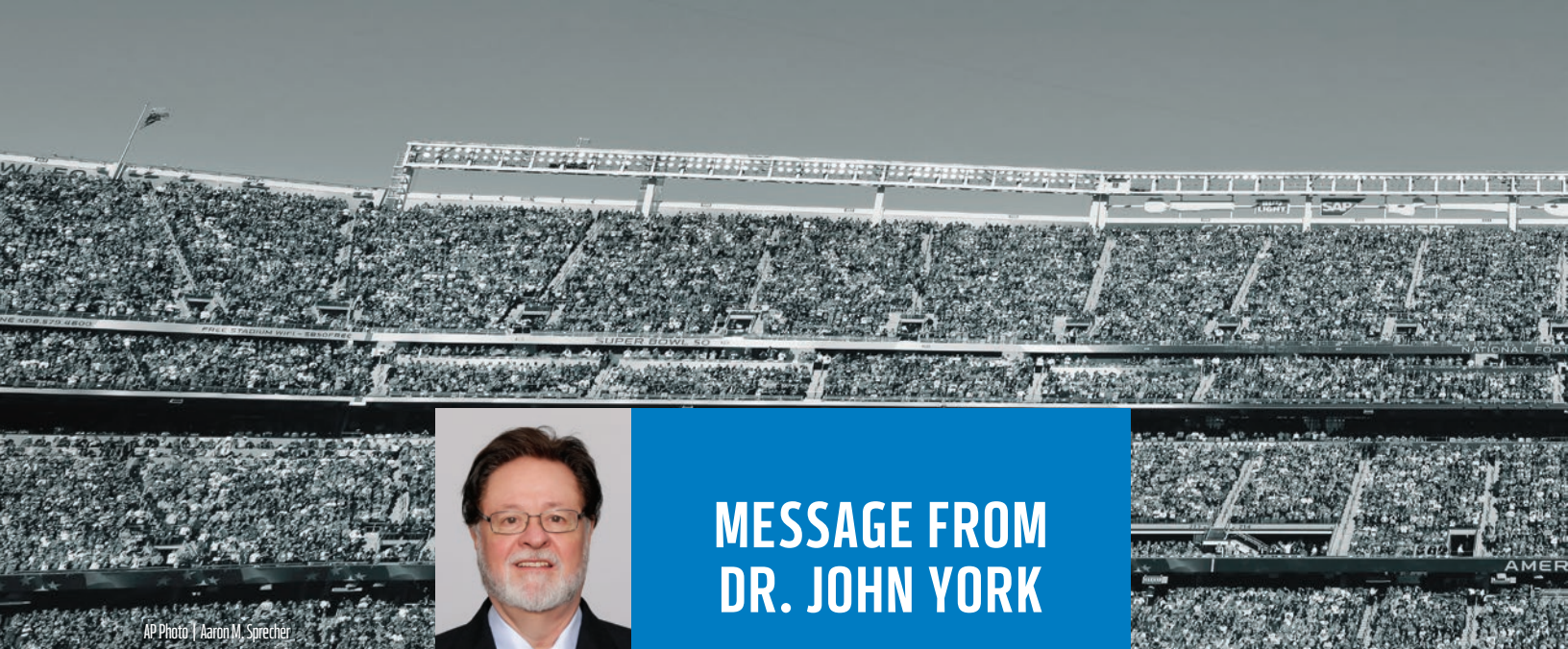
rule changes for the 2016 season include the elimination of all chop blocks and an expansion of the horse-collar tackle rule.

Stricter concussion protocol enforcement also takes effect. The protocols must be carefully followed, and a failure to do so may result in fines and possibly the loss of draft picks.

This report includes a preview of what is to come under this new initiative, along with highlights and statistics from the 2015 season. Our goal is to better inform our players, clubs and NFL fans of what we are doing to make football safer at all levels.

Our work toward this goal will never be finished—as we continue to learn more from science, data, collaboration with independent experts and experience, we will make further changes. I look forward to reporting even more progress this time next year.

**Roger Goodell**  
NFL Commissioner



AP Photo | Aaron M. Sprecher



# MESSAGE FROM DR. JOHN YORK

**In this report, you'll read a story of commitment—to continuous improvement, to data-driven decision-making and to smart, safe play at all levels of the game.**

Using innovative research and sophisticated data collection, we're developing resources that empower our players to make informed decisions for themselves on the field. These resources include instructional videos that guide better equipment selection and fitting as well as yearly evaluations that denote top-performing brands of helmets and cleats—all informed by simulations, studies and rigorous independent research.

Data also guides us as we continue to use sophisticated methods of collection and analysis to track incidence of concussion and other injuries—and work to evolve the game in ways that we hope will prevent or reduce injuries.

We continue to update and improve how we work with outside experts

to inform our decisions. Our many experts desired a forum where they could interact across disciplines, so we reorganized our medical committee structure to do just that. In addition, we continue to work closely with the NFL Players Association. For example, we've created a new committee to monitor game day surfaces. For the vast array of institutions and medical professionals who volunteer their time and expertise to the NFL, these changes will strengthen their collaboration.

Not all of our recent changes have stemmed from data or organizational efforts. We continue to see a true change in our culture as well. In my role as Chairman of the NFL Owners' Health and Safety Advisory Committee, I have the privilege of seeing a growing awareness of

the importance of safety within professional football—a culture change that is ultimately producing real results for athletes of all ages.

What lies ahead? An even stronger commitment toward protecting players, advancing technology and medical research and sharing what we learn.

Together as a team, we will realize our vision of improving safety in all sports, for all athletes.

**John York, M.D.**

Co-Chairman, San Francisco 49ers  
Chairman of the NFL Owners' Health and Safety Advisory Committee



## MESSAGE FROM DR. BETSY NABEL

**In my rookie season with the NFL, I saw  
the power of teamwork in action.**

Examples abound in this report. Players and equipment managers now have new tools to guide them in smart gear selection. Head Health Challenge grantees are making advances in diagnostic tools, safety equipment and playing surfaces, supported by the NFL and its partners GE, Under Armour and the National Institute of Standards and Technology.

Building on the success of these initiatives, the League, the NFL Players Association and their expert partners are turning to crowdsourcing—with high-tech support—as a next step. Stay tuned as manufacturers, small businesses, entrepreneurs, universities and others submit new ideas for improved protective equipment, including helmets.

As any football fan knows, teamwork is key to making gains on the field, and we're supporting these efforts through the *Play Smart. Play Safe.* initiative. We're allotting \$60 million for the engineering collaborations mentioned above and more than \$40 million for medical research over the next five years, primarily dedicated to neuroscience.

To improve the prevention, diagnosis and treatment of injuries, we drafted the best and brightest minds in the League's medical advisory committees, and we're assembling a new, independent, scientific advisory board to identify and support the most compelling proposals for scientific research.

We're extending lessons learned in our research to athletes in all sports

and all levels. Through initiatives like the annual International Concussion Think Tank, we're expanding our collaborations across global sports organizations—sharing research, innovation and protocols that we hope will improve safety even more broadly.

The NFL is leading the way on player health and safety and has an unmatched platform to have a watershed effect—not just in professional football, but for athletes of all ages and across all sports. That is our goal and we won't rest until we reach the end zone.

**Elizabeth G. Nabel, M.D.**

NFL Chief Health and Medical Advisor



AP Photo | Evan Pinkus



**Football is the ultimate team sport. In an effort to improve the health and well-being of its players, the NFL has assembled the ultimate team.**

## Restructured Committees Strengthen Our Health and Safety Commitment

The NFL receives counsel from some of the country's finest medical and scientific experts in the fields of neuroscience, orthopedics, sports medicine and more. They are affiliated with prestigious clinics, health systems and university medical centers, club medical teams and professional organizations.

Working together in NFL medical committees, these men and women volunteer their time to study injury prevention issues in depth. They guide the League on best practices, scientific research and which policies, programs and protocols to adopt. Starting with the NFL Scouting Combine in February, members meet to:

- Analyze injury data from the previous season
- Discuss statistical trends and outliers
- Identify important questions for further analysis and reporting
- Make recommendations and contribute to decisions in areas such as rules, return-to-play protocols and equipment testing
- Recommend research priorities

To further strengthen the efficacy of their efforts, the NFL reconfigured its medical committee structure in 2016. All committees now report to an overarching Health and Safety Committee. Composed of chairmen of the General Medical Committee, the Head, Neck and Spine Committee and the Musculoskeletal Committee, this

group now has authority to oversee committee efforts and facilitate cross-specialization discussion among subject matter experts, team physicians and trainers.

Bolstering the League's commitment to injury protection on the field, the NFL and NFL Players Association (NFLPA) in 2016 established the Field Surface and Performance Committee, a joint committee to provide advice and guidance regarding the safety, performance and testing of game day and practice surfaces. And in the League's ongoing mission to make the game safer for those who play it, each and every medical committee includes participation by representatives from the NFLPA, including its longtime Medical Director, Dr. Thom Mayer.

**“Our mission is to protect the health and improve the safety of NFL players. However, our scientific goals and accomplishments are more far reaching – to improve sports safety for all athletes and the general population.”**

**Dr. Rich Ellenbogen, Co-Chairman of the NFL's Head, Neck and Spine Committee**

# MEDICAL COMMITTEES

## ADVANCING SAFETY FROM HEAD TO TOE

### Health and Safety Committee

This committee brings together chairmen from the NFL's General Medical, Head, Neck and Spine, and Musculoskeletal committees, plus representatives from the NFLPA, the Professional Football Athletic Trainers Society (PFATS) and the National Football League Physicians Society (NFLPS)—a professional organization made up of 170 world-class physicians committed to providing NFL players with superior medical and surgical care.

This committee is designed to encourage representatives from every discipline to collaborate regularly, share experiences and jointly prioritize research projects to make the game safer.



- **The General Medical Committee** focuses on the health and safety of active NFL players related to environmental conditions, pain management and behavioral and cardiovascular health. Hypertension, arrhythmias, heat stroke and infectious disease treatment and prevention all fall under this committee's purview. The committee will also focus on pain management. Building on the work of the NFL Physicians Society and their analysis of pain management practices, the General Medical Committee will look to advance the science and best practices on this important topic.



- **The Head, Neck and Spine Committee** analyzes injury data and proposes interventions for the diagnosis, prevention and treatment of concussions and conditions of the neck and spine. The committee develops improvements to the concussion protocol and works with unaffiliated doctors to improve concussion care. This committee actively advocates for and improves public education related to sports safety and, through its engineering subcommittee, oversees research in areas such as biomechanical engineering.



- **The Musculoskeletal Committee** focuses on fractures, muscle strains and ligament sprains of the foot, ankle, leg, shoulder, trunk, elbow, wrist and beyond. The committee analyzes injury data and trends and studies injury mechanisms and prevention, equipment and footwear, playing surfaces and relevant rule changes.

### Owners' Health and Safety Advisory Committee

Advised by the specialized medical committees, the Owners' Health and Safety Advisory Committee works collaboratively with clubs, committees and medical staff to try to improve player care.





**“My parents recognized early on what it did for us to learn to play, the values that it would instill in all of us.”**

**Charlotte Jones Anderson, Dallas Cowboys Executive Vice President and Chairman of the NFL Foundation, NFL Women's Summit**

AP Photo | John Raoux



## The NFL Foundation Drives Health and Safety Initiatives Nationwide

The NFL Foundation is the League's nonprofit organization. On behalf of the 32 NFL clubs, it makes grants directed at improving the health, safety and wellness of athletes, encouraging healthy activity through youth football and enriching communities that support the game. Core NFL Foundation health and safety initiatives include:

A five-year, \$45 million grant to USA Football, the sport's national governing body and a member of the U.S. Olympic Committee. USA Football supports football development, participation, safety and values through programs including Heads Up Football and NFL FLAG.

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More than 300 free youth football camps each year, hosted by current and former NFL players and coaches, emphasize the values of sportsmanship, safe play and healthy practice.

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A partnership with the National Athletic Trainers' Association (NATA), Gatorade and Professional Football Athletic Trainers Society (PFATS) to fund athletic trainers in underserved high schools nationwide. To date, 20 NFL teams are working to increase access to athletic trainers in their communities.

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Partnerships devoted to promoting athlete health and safety at all levels of sport with the American Academy of Family Physicians (AAFP), the Korey Stringer Institute (KSI), NATA and PFATS.

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Back to Sports, a program with the American Heart Association (AHA) to deliver sports safety information to parents and caregivers. During the 2015-2016 school year, 100 mini-grants were awarded to athletic trainers to hold events across the country.



AP Photo | David J. Phillip

Former NFL football player Nate Burleson, right, looks at the Vicis Zero1 football helmet as he talks with Vicis Chief Executive Officer and co-founder Dave Marver before a NFL health and safety news conference.



# ADVANCED TECHNOLOGY



AP Photo | Ryan Kang

**Innovations in equipment and technology can lead to significant gains in safety. The NFL supports efforts by researchers and industry to advance player protection, diagnosis and treatment.**

In 2013, the NFL debuted its Head Health Initiative, a four-year, \$60 million collaboration with GE. The initiative invited innovators and entrepreneurs from around the world to develop solutions that would make concussion diagnosis faster and more reliable and improve treatment for traumatic brain injury (TBI)—all to enhance the safety of athletes, members of the military and society overall.

The initiative works through two components:

- 1** An open innovation program (the three-part Head Health Challenge) that awards grants to scientists, academics, experts and entrepreneurs
- 2** A research and development program focused on next-generation imaging technologies

By the fall of 2016, more than 1,000 applicants had submitted ideas through the Challenge’s three parts.



## HEAD HEALTH CHALLENGES

<b>3</b>	<b>30</b>	<b>1,000+</b>	<b>\$20M</b>
INNOVATION CHALLENGES	COUNTRIES REPRESENTED	CONCEPTS SUBMITTED	IN OPEN INNOVATION CHALLENGES

**“The winning materials show a great deal of ingenuity in their approaches to energy absorption and have the potential to improve the next generation of protective systems.”**

*Willie E. May, NIST Director, NIST.gov, December 15, 2015*

# HEAD HEALTH CHALLENGE I: ACCELERATING DIAGNOSIS



One way to strengthen efforts in concussion diagnosis is through the development of a prompt, reliable and easy-to-use test for concussive injury and recovery. Head Health Challenge I launched in 2013 to this end.

From a pool of more than 400 entrants, the NFL and GE funded 16 finalists with ideas for new tools for identifying mild traumatic brain injury. In July 2015, these six grand prize winners received additional support:

**400+**  
ENTRANTS

**16**  
FINALISTS

**6**  
GRAND PRIZE  
WINNERS

**Banyan Biomarkers** is implementing the first point-of-care blood test for mild and moderate brain trauma. The company is working with the University of Florida to analyze biomarkers, neurocognitive testing and neuroimaging on concussed athletes.

**BrainScope Company, Inc.** is developing handheld technology for traumatic brain injury detection and working with the Purdue University's Neurotrauma Group to use imaging biomarkers in the study of collegiate athletes. On September 26, 2016, BrainScope announced that the Food and Drug Administration (FDA) had cleared the company to market its Ahead 300 device, which offers clinicians a comprehensive panel of data to assist with TBI diagnosis.

**Medical College of Wisconsin** is using MRI technology to determine the effects of concussion on brain function and studying ways to diagnose concussions and determine a player's ability to return to play.

**The University of Santa Barbara** is creating software to examine the effect of head injury on cross-brain transmissions of information and using MRI technology to identify areas of the brain that may become disconnected.

**The University of Montana** is using blood-based biomarkers to chart the brain's reaction to a traumatic injury and exploring markers like proteins and RNA as indicators for brain injury and recovery.

**Quanterix** is developing a simple blood test for traumatic brain injury detection and using digital immunoassay technology to measure brain injury biomarkers in the blood.



# HEAD HEALTH CHALLENGE II: IMPROVING PREVENTION



The second Head Health Challenge continued the League's commitment to leveraging creativity in the laboratory to advance sports safety and public health. Its focus: innovation toward the prevention of brain injury.

In November 2014, the NFL, GE and new partner, Under Armour, awarded seven Head Health Challenge II grants. The finalists included:

**450+**  
ENTRANTS

**7**  
FINALISTS

**3**  
GRAND PRIZE  
WINNERS

## GRAND PRIZE WINNERS INCLUDE:

**The U.S. Army Research Laboratory** created rate-dependent tethers that attach to a player's helmet and torso. These tethers allow free motion at low speeds but provide high-force resistance during high speeds, minimizing sudden accelerations in the event of a high-speed collision while letting a player move his head during play.

**VICIS** and its academic partner, the **University of Washington**, have developed a football helmet with a novel impact-absorbing structure. Known as the Zero1Helmet, it features a soft shell that acts like a car bumper and vertical struts inside the helmet that bend and buckle in an effort to mitigate forces that may lead to concussions and brain injuries.

**Viconic**, an automotive safety company that started a new business in sports safety, developed an underlayer for synthetic turf systems. A layer of bubble-like plastic knots, it's designed to crush efficiently during impact, then quickly return to its original shape.

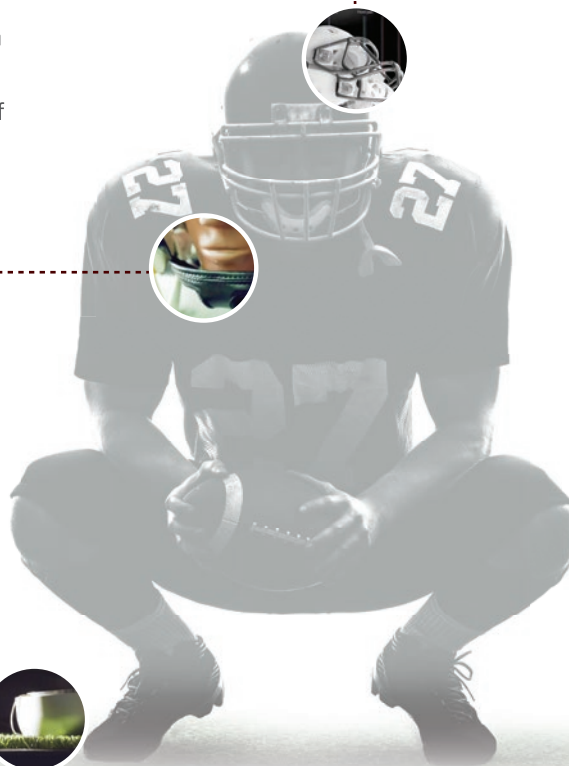
## FINALISTS INCLUDE:

**UCLA and Architected Materials, Inc.**, which used microlattice material to create an under-helmet liner intended to offer improved energy absorption and brain protection.

**The University of Miami Miller School of Medicine (collaborating with the University of Pittsburgh School of Medicine and Neuro Kinetics, Inc.)**, which created a portable eye goggle in an effort to identify mild traumatic brain injury in real time.

**Emory University**, which developed a handheld medical device that is intended to allow the screening and assessment of concussions from the sidelines in near real-time.

**The University of New Hampshire**, which evaluated the HUTT Technique helmetless system for tackling training used in many high schools.



# HEAD HEALTH CHALLENGE III: EMPHASIZING MATERIALS SCIENCE



The third Head Health Challenge brought the National Institute of Standards and Technology (NIST) on board as a new partner, lending its expertise to design a test methodology for examining submissions and creating industry-wide standards.

This round posed a new question: What new or repurposed materials can do a better job of absorbing or mitigating force for helmets, pads and other sports and consumer products? From around the country, 125 teams submitted their answers. On December 15, 2015, five finalists were awarded additional funding to further their winning ideas:

**125+**  
ENTRANTS

**5**  
FINALISTS

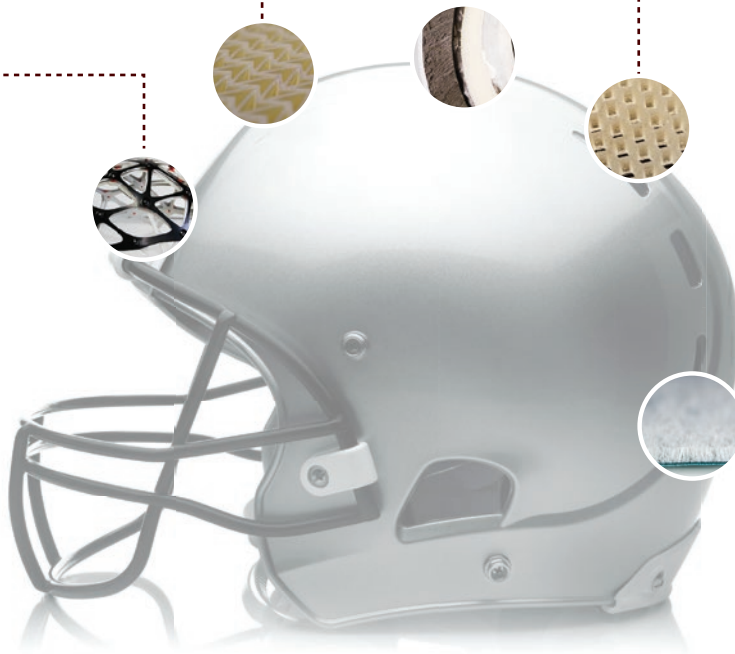
**1**  
GRAND PRIZE  
WINNER (TO BE  
ANNOUNCED IN 2017)

○ **Charles Owen, Inc.** drew from the space industry, specifically materials for solar array packing, for its innovation: material composed of stacked, origami-like cellular structures that fold efficiently, yet optimize energy absorption.

○ **The University of Michigan** designed a lightweight, multi-layered composite that includes a viscoelastic material in an effort to limit the force of multiple, repeated impacts.

○ **Alba Technic, LLC** developed a shock-absorbent honeycomb material with an outer layer that changes into a hard shell upon impact, in an effort to spread energy and better protect the user.

○ **Dynamic Research, Inc.** and **6D Helmets LLC** evolved 6D's single-impact suspension technology for use in repeat impact conditions. The multi-layer material features an outer layer that moves independently of the inner layer in an effort to reduce the effects of both angular and linear impacts.



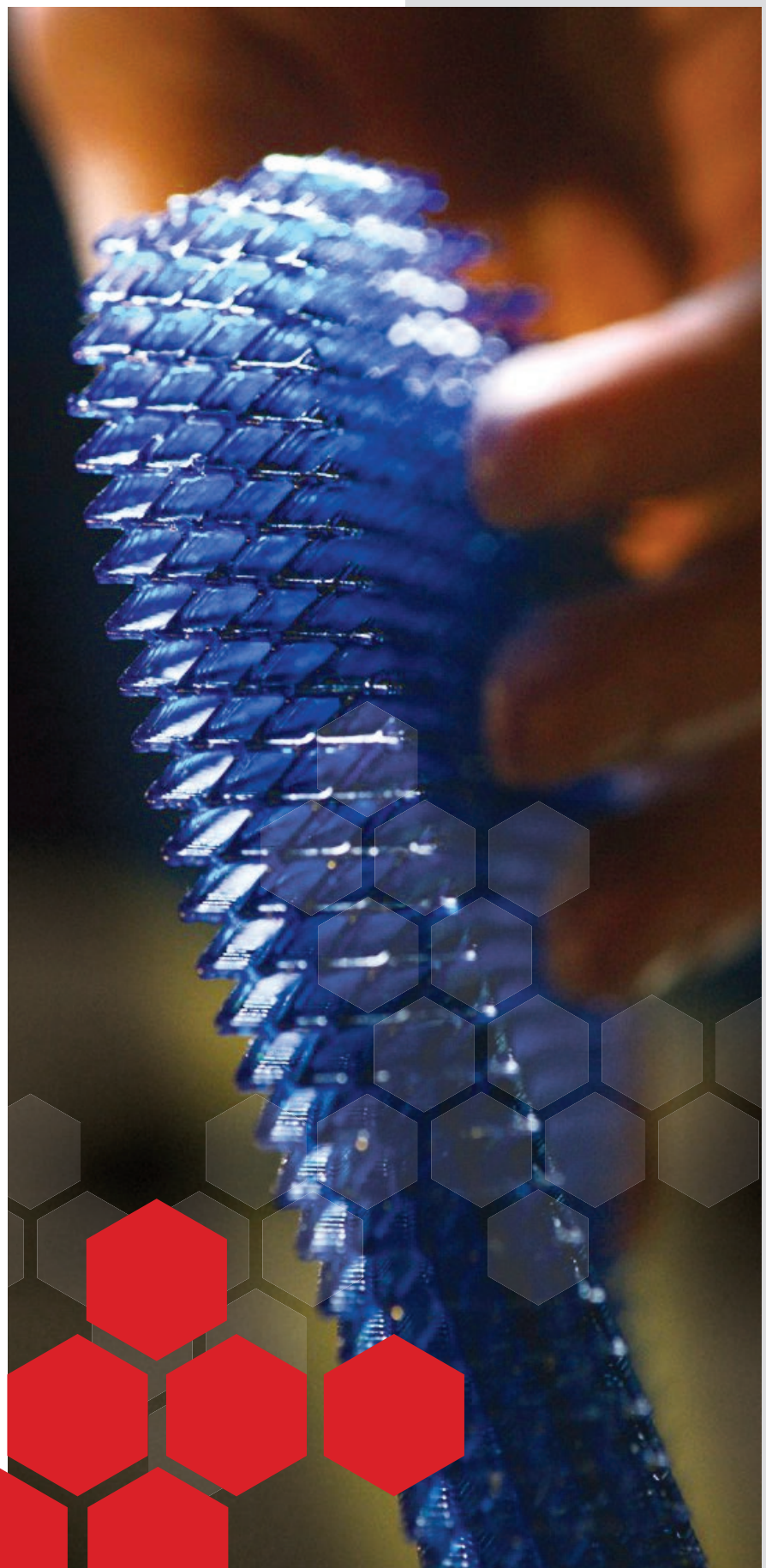
○ **Corsair Innovations** developed a textile with tiny, spring-like fibers that seek to repel rotational and linear impacts. Unlike foam materials, the textile is washable and breathable, possesses wicking capabilities and is intended to be easily engineered to impact performance requirements.

**“The innovations in materials science that we’ve seen in this challenge will have significant applications in a range of equipment that attempt to better protect our athletes, soldiers, children and others.”**

Jeff Miller, NFL Executive Vice President of Health and Safety Initiatives

**“The goal of convening the brightest engineers, scientists and inventors was to advance and produce better materials for preventing injury, better tools for physicians and better treatments for patients. Based on what we’ve seen from these five winners, we are moving forward in a positive direction.”**

Alan Gilbert, Director of Healthymagination, GE



# The GE/NFL Head Health Initiative: Research & Development



INNOVATION • ADVANCEMENT • PROGRESS

## NEXT-GENERATION MRI TECHNOLOGIES

The GE/NFL Head Health Initiative (HHI) has fostered the development of several novel magnetic resonance hardware and software imaging (MRI) technologies aimed at acquiring high-resolution images of the brain to better understand physiology, function and structure. These technologies are still works

in progress, and one technology of note is a newly designed piece of MR imaging hardware, commonly referred to as an MRI brain coil. The MRI coil fits around the patient's head with the goal of producing images faster with higher resolution and increased clarity.\*

An MR imaging coil contains electronics and "antennas" that are designed to acquire as much MRI signal as possible to produce the clear, well-defined images of the brain's structure. The GE/NFL HHI brain coil incorporates 48 antennas to capture more signal than previous designs. The large number of antennas also aids in acquiring MR images faster to speed up imaging times and reduce overall exam times.

Special attention was paid to the mechanical design with the NFL athlete in mind. Historically, high-performance MRI coils with a large number of antennas were smaller and could not accommodate patients with larger head sizes. This problem was

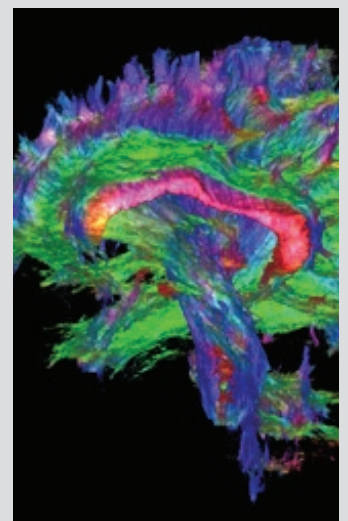
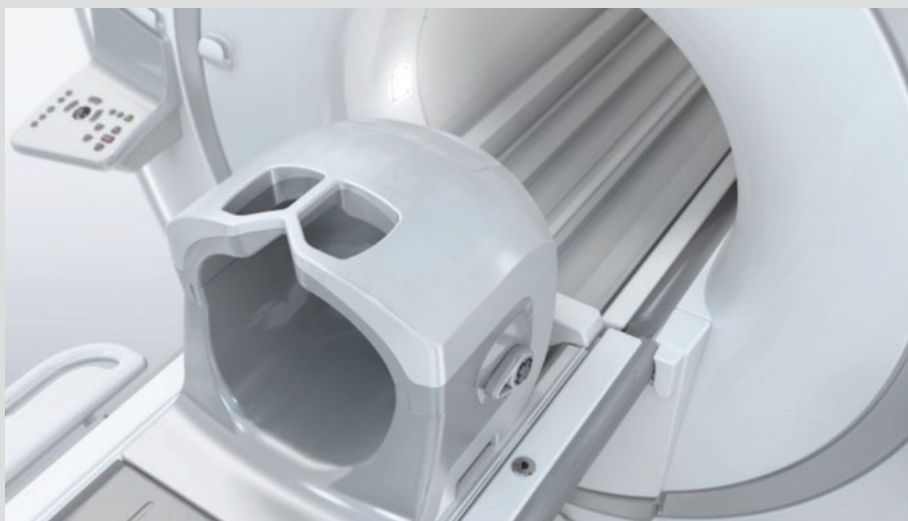
addressed by utilizing a "split design" that allows for the coil to expand to fit larger heads, ensuring that more than 99% of head sizes can fit within the device. The GE/NFL HHI brain coil can be tilted from front-to-back to help it conform to the cervical spine region while improving

comfort. And finally, the new coil incorporates a bi-directional mirror device so patients can see outside of the MRI machine while being scanned.

### DID YOU KNOW?

The GE/NFL HHI brain coil incorporates 48 antennas to capture more signal than previous designs.

*\*Technology in development represents ongoing research and development efforts. Not yet for sale. Not cleared or approved by the U.S. FDA or any other global regulator for commercial availability.*





## LOOKING AT MTBI DEEPER IN THE BRAIN

As part of the GE/NFL Head Health Initiative, the research program utilizes state-of-the-art MRI technology to understand how mild TBI affects the brain. The study seeks to discover imaging signatures that could aid in the diagnosis, prognosis and clinical management of mild TBI. Some of the MR imaging biomarkers that are currently being studied to help clinicians understand how mild TBI affects brain function, structure, and physiology include:

- Detection of anatomical abnormalities (for example, microbleeds);
- Injuries of the white matter (axonal shear or swelling) via diffusion MRI;
- Changes in functional connectivity of the brain via resting-state functional MRI; and

- Cerebral blood flow (grey matter perfusion) and volumes of select subcortical grey matter nuclei.

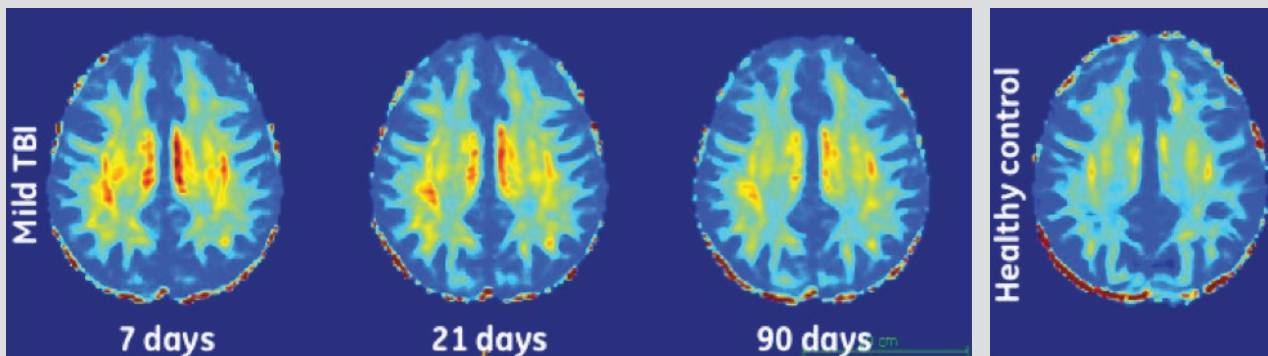
Since 2014, we have partnered with several leading healthcare and academic facilities to perform clinical research on concussions, including Hospital for Special Surgery, Houston Methodist, University of California San Francisco, Medical College of Wisconsin, University of Pittsburgh Medical Center and University of Miami. To date, more than 175 mild TBI patients have enrolled in

the research study and followed their progress toward recovery. In 2016, investigators from GE and our academic partners presented initial results from the study at international scientific conferences that include the annual meetings of the American Academy of Neurology, the International Society of Magnetic Resonance in Medicine and the National Neurotrauma Society.

As more patients enroll in the research study and improve the sensitivity and specificity of the MRI imaging signatures, the team aims to further translation of the most promising findings toward clinical practice. Armed, through advanced imaging, with more powerful insights into how neurotrauma changes the brain, clinicians will be better equipped to discover new treatments, empower patients with direct visualization of the injury in their brain and ultimately provide better care for TBI.

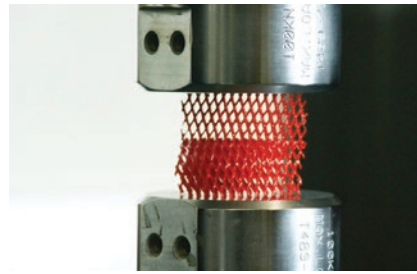
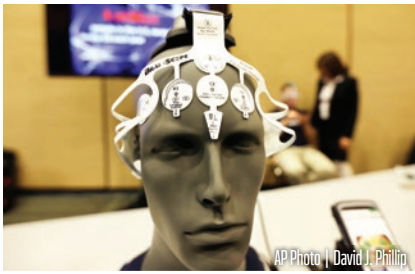
### DID YOU KNOW?

More than 175 mild TBI patients have enrolled in the GE/NFL Head Health Initiative research study and followed their progress toward recovery.



Advanced diffusion MRI (diffusional kurtosis map 7, 21, 90 days after injury shown in the figure) helps clinicians visualize recovery of the white matter in a 27-year-old woman who suffered a concussion while practicing martial arts. As it is the case in many mild TBI patients, conventional structural MRI was normal at all time points for this patient and did not show any evidence of injury or recovery. For comparison, diffusional kurtosis map is shown in the right panel for a demographically matched healthy control.

*The images shown were obtained using an investigational device limited by law to investigational use and not cleared, approved, licensed or authorized by the U.S. FDA or other regulatory authorities for commercial availability.*



## HIGHLIGHT REEL



### BRINGING THE POWER OF SENSORS TO THE PLAYING FIELD

From cars to clothing, sensor technology is all around, taking data and measurement to granular levels of precision. Yet sensors do not yet exist that accurately measure what happens to the helmet and the head during a concussion-causing impact. By incentivizing the development of sensors that measure on-field impacts, the NFL's engineering roadmap aims to change this.

Data from such sensors, coupled with information from video reviews and reconstructions, will give engineers around the world access to an unprecedented data repository, enabling them to design safer helmets and more effectively test how those designs will perform on the football field.

## The Next Challenge: Crowdsourcing a World of Engineering Innovation

**“Advances in protective equipment are possible with the dedication of engineering expertise, the right tools and data and the right incentives.”**

**Jeffrey Crandall, Ph.D., Chair of the NFL Head, Neck and Spine Engineering Subcommittee**

The NFL is committed to championing new developments in engineering, biomechanics, advanced sensors and material science.

What's next? Experts imagine more advanced and potentially position-specific helmets in three to five years, leveraging the modern tools and rich data analysis that have strengthened safety in the automotive industry and the crowdsourced wisdom that has made the Head Health Challenges successful.

Through the *Play Smart. Play Safe.* initiative, the League is allocating \$60 million to help make this vision reality.

Through this new initiative, the NFL, the NFLPA and engineers from the **University of Virginia**, **Duke University**, the **University of Pennsylvania** and other leading research institutions around the world will provide the resources and information necessary to stimulate a marketplace of design solutions. And helmet companies, manufacturers, small businesses, entrepreneurs, universities and others will contribute their game-changing innovations.

With the development of modern engineering tools, which will be made available to the public, anyone with an idea will be able to test concepts for different helmet shapes, sizes, materials and designs in a digital environment at minimal cost. Meanwhile, videos and digital reconstructions of injury-causing plays will strengthen collective understanding of the physics underlying football injuries, so these findings can be used in equipment design.

**Football Research, Inc.**, a nonprofit corporation dedicated to the research and development of novel methods to prevent, mitigate and treat traumatic head injury, and its partners will solicit ideas throughout the year, with selected teams receiving mentorship, monetary rewards and continued ownership of their ideas.



# MEDICAL RESEARCH

AP Photo | Luis M. Alvarez

**Find the brightest scientific minds in the field today. Give them the platform, space and connections to work together. That's the NFL's strategy for expediting progress in the prevention, diagnosis and treatment of concussion and other injuries.**

Through the *Play Smart. Play Safe.* initiative announced in September 2016, \$40 million has been allotted for medical research over the next five years, primarily dedicated to neuroscience. This is in addition to \$60 million in funding dedicated to collaborative research in engineering. Also in 2016, the League is assembling an independent scientific advisory board to identify and support the most compelling proposals for scientific research into concussions, head injuries and their long-term effects.

## A Second Think Tank Furthers Concussion Knowledge and Action

Where are the knowledge gaps in concussion diagnosis, protocols, management and treatment? How can sports worldwide become safer and better?

**“The spirit and collaboration and good will among medical experts in these international sports leagues was extremely high.”**

**Dr. Betsy Nabel, NFL Chief Health and Medical Advisor**

At the first **International Sports Concussion Research Think Tank** in August 2014, the NFL brought leading scientific and medical experts from preeminent international sports organizations to the League's headquarters to address questions like these.

On October 24, 2015, in London, participants met again to build on previous accomplishments and focus on core priorities:

- Research that enhances sideline assessment tools for concussions
- Improved rehabilitation techniques following injury
- Research programs to enhance concussion recognition and management
- Better understanding of the long-term effects of head trauma

The **Canadian Football League (CFL)** shared updates on its tests of a concussion diagnostic known as the King-Devick Test. According to experts working on the research, impaired eye movements can occur even when athletes appear to be asymptomatic after a suspected head injury. The King-Devick Test measures a player's eye movements, as well as speed and language function, against a pre-season baseline.

## HIGHLIGHT REEL

### 2015 INTERNATIONAL SPORTS CONCUSSION RESEARCH THINK TANK PARTICIPANTS

- ↘ Australian Football League
- ↘ Canadian Football League
- ↘ European Jockeys
- ↘ Federation Equestre Internationale
- ↘ Fédération Internationale de Football Association
- ↘ GE
- ↘ International Ice Hockey Federation
- ↘ Institute of Sport Exercise and Health
- ↘ Rugby Football Union and International Rugby Board
- ↘ National Collegiate Athletic Association (NCAA)
- ↘ NFL Head, Neck and Spine Committee
- ↘ NFL
- ↘ NFLPA
- ↘ National Hockey League
- ↘ United States Olympic Committee



The CFL, in partnership with the NFL, has been working to see if the test increases the accuracy of concussion diagnosis, thereby identifying players who need to be removed from play. Four CFL clubs and several Canadian universities have added the King-Devick Test to their sideline concussion protocol and the CFL is extending the study to all of its teams for the 2016-2017 season.

Dr. Mike McCrea from the **Medical College of Wisconsin** and Dr. Kevin Guskiewicz from the **University of North Carolina** announced research that will explore whether players with concussions benefit from rest or a more active approach to rehabilitation. This includes treatment for balance and vision problems, which may lift a player's mood and provide beneficial stimulation. To ensure representation by a wide spectrum of athletes, the team will work across professional organizations, including New

Zealand Rugby and the Canadian Football League, as well as with colleges in America.

The NFL also announced a partnership with the **International Concussion and Head Injury Research Foundation (ICHIRF)** to fund research into the potential long-term effects and risk factors associated with concussion in high-impact sports, including horse racing.

One ICHIRF study launched in January 2016 is investigating potential associations between concussion and chronic traumatic encephalopathy (CTE) in retired jockeys in Britain, Ireland and France. It's part of the independent, longitudinal Concussion in Sport project exploring whether these athletes have an increased incidence or an earlier onset of degenerative disorders such as CTE, Alzheimer's disease and Parkinson's disease.

## A Premier Conference Delivers Unified Guidance on Concussion Treatment

Leading U.S. concussion clinicians and researchers met to discuss the best practices, protocols and active therapies for concussion treatment.

These discussions took place October 15 and 16, 2015, at the **University of Pittsburgh Medical Center (UPMC)**. Of the 37 invited experts, participants represented:

- ↘ Centers for Disease Control and Prevention
- ↘ National Institutes of Health
- ↘ United States Department of Defense
- ↘ NCAA
- ↘ NFL
- ↘ NFL Physicians Society
- ↘ NFLPA
- ↘ USA Football
- ↘ USA Rugby
- ↘ U.S. Soccer
- ↘ Several high school and college organizations

"We want to move the needle, and this meeting could do that," said Michael "Micky" Collins, Executive and Clinical Director of the UPMC Sports Medicine Concussion Program and Associate Professor in Orthopaedic Surgery. He led the event along with co-directors Anthony Kontos and David Okonkwo of UPMC and the University of Pittsburgh. The event was made possible through a grant from the NFL Foundation.

# BRAINSPORT PROGRAM

## UCLA Steve Tisch BrainSPORT Program Accelerates Understanding of Youth Concussions

As a practitioner and professor of pediatric neurology, Dr. Christopher Giza understands the many distinctions involved with preventing, diagnosing and treating concussions among youth athletes versus their adult counterparts. “All of the differences add significantly to the cost and complexity of the task of studying youth concussions,” he said. “Youth athletes are different, requiring distinct types of assessments, diagnostic tools, protective equipment and treatments based upon their age.”

Dr. Giza recognized a glaring need for organized, multi-center research into sports-related traumatic brain injury (TBI) at the youth level. So in 2012, he created the UCLA BrainSPORT program. In 2014, philanthropic support from Steve Tisch, Chairman and Executive Vice President of the New York Giants, made the program the nation’s largest public/private collaborative sports concussion program and renamed it the UCLA Steve Tisch BrainSPORT Program. The gift was announced during a White House summit on youth and sports concussions.

According to Dr. Giza, BrainSPORT is the only program with complete integration, from basic science animal models of pediatric TBI, to clinical

“Particularly in children and adolescents, the brain’s network is not fully developed and this is critically important to understand when studying how it is affected by concussion and how it recovers.”

Dr. Christopher Giza, Director, UCLA Steve Tisch BrainSPORT Program

research of unique aspects of TBI in kids, to a multidisciplinary clinic providing evidence-based concussion care for children and young adults.

Funding is enabling UCLA to create the first sports neurology fellowship focused on youth concussions; however, Tisch BrainSPORT fellows include both pediatric and adult neurologists as well as neuropsychologists. Meanwhile, researchers are examining the effects of impact interval on concussion recovery, using animal models to study sex differences in concussions and conducting lab and clinic investigations into the effects of fear and anxiety in prolonging concussion recovery.

The BrainSPORT program’s work extends beyond basic science to public outreach and education as well. In a survey of almost 600 parents across the United States, for example, BrainSPORT researchers found that the vast majority believed in outdated advice regarding recovery of children diagnosed with concussions.

### LEVERAGING STRENGTH IN NUMBERS

One of the program’s biggest highlights involves its work with

other institutions, according to Dr. Giza. BrainSPORT participated in the National Sports Concussion Outcomes Study, which collected and analyzed comprehensive data from multiple collegiate teams and paved the way for the NCAA-Department of Defense CARE (Concussion Assessment Research and Education) consortium, the largest prospective study of sports concussions ever conducted.

In less than two years, CARE has conducted over 25,000 baselines and collected data from over 1,200 concussions. In 2017, UCLA Steve Tisch BrainSPORT, as one of four original CARE Advanced Research Core (ARC) sites, will join forces with the Pac12 and NCAA to host a joint meeting providing a cutting-edge view of the most recent advances of the consortium in the field of sports-related concussions.

In another joint effort, BrainSPORT, in collaboration with colleagues from several other institutions, established the Four Corners Youth Consortium to address the significant need to improve the science underlying injury to the developing brain. The Consortium is developing a national database for mild TBI in youth, with initial funding through UCLA Steve Tisch BrainSPORT and the University of Washington.

“Neuropsychologists, neurosurgeons, neurologists, psychiatrists, physiatrists, family medicine physicians, emergency medicine physicians, physical therapists, certified athletic trainers, researchers—people from across so many disciplines—are uniting for the first-ever conference to reach agreement on active treatments for concussion.”

Micky Collins, Executive and Clinical Director of the UPMC Sports Medicine Concussion Program, UPMC.com, September 15, 2015



## NIH Researchers Work to Advance Concussion Knowledge



In 2012, the NFL donated \$30 million

to the **Foundation for the National Institutes of Health (FNIH)** to improve diagnosis of and better understand the potential long-term effects of repeated head injuries. That gift launched the Sports and Health Research Program with the NFL, FNIH and the National Institutes of Health (NIH), with initial research recipients announced in 2013.

NIH research grantees include the **Boston University School of Medicine** and **U.S. Department of Veterans Affairs**, working together to use post-mortem brain tissue to distinguish CTE from disorders such as Alzheimer’s disease and ALS. A team of researchers from **Mount Sinai Hospital** and the **University of Washington** is comparing the chronic effects of mild, moderate and severe traumatic brain injury with the features of CTE.

Other grantees with pilot-stage research projects include:

- ↘ **Seattle Children’s Hospital, Seattle, Washington:** Using magnetic resonance spectroscopy to monitor gamma-aminobutyric acid (GABA) levels in adolescents who have sports-related concussions and compare levels to those in adolescents without injuries
- ↘ **Nationwide Children’s Hospital, Columbus, Ohio, and Colorado School of Public Health, University of Colorado, Aurora, Colorado:** Evaluating mobile app Spot Light’s effectiveness in generating more reports of concussions, more referrals to doctors and better adherence to return-to-play guidelines
- ↘ **Indiana University School of Optometry, Bloomington, Indiana:** Developing a portable eye-tracking instrument to help diagnose concussions on the sidelines and to monitor injury progression in high school and college athletes
- ↘ **Baylor College of Medicine, Houston, Texas:** Looking at concussions’ effects on brain structure and function in adolescents cleared to play and evaluating potential biomarkers for concussions and recovery
- ↘ **Kennedy Krieger Institute, Baltimore, Maryland:** Investigating the potential of somatosensory system information processing (which processes information such as what an object feels like to touch) as a biomarker for concussion and recovery in youth aged 13 to 17
- ↘ **Massachusetts General Hospital, Boston, Massachusetts:** Studying post-concussion changes in brain molecules and byproducts to uncover metabolites (a type of molecule) that contribute to serious effects of traumatic brain injury and identify potential targets for detecting and treating concussions



# PROTECTING PLAYERS

**To enhance the health, safety and overall well-being of current players and all of those who made our game great, the NFL works on multiple fronts: changing rules, expanding care, analyzing data and making connections.**

## Statistics Illustrate Effects of Culture Change

The NFL uses injury data collected and reviewed by **Quintiles**—an independent third party—and input from medical advisors, Quintiles itself, clubs, players, coaches, the Competition Committee and the NFLPA to constantly evaluate how new rules and technology may improve safety.

Preliminary data released in January 2016 reported that 182 concussions occurred during 2015 regular season games. This is a 58 percent increase over the same time period in 2014 and a 25 percent increase over the average from 2012-2014.

“The data today does show an increase in concussions, and the NFL is committed to understanding the reasons,” said Dr. Betsy Nabel, NFL

Chief Health and Medical Advisor, in a January 29, 2016, joint announcement with Dr. Nancy Dreyer, Global Chief of Scientific Affairs and a Senior Vice President at Quintiles. “Several possibilities include increased screening, increased detection, increased self-reporting and potentially an absolute increase in the number of injuries.”

Better identification, assessment and treatment is a goal, as that means more players are getting the care they need. In fact, player screenings during games have doubled year over year. This increase in screenings is consistent with the culture change described throughout this report and encouraged by the League.

The NFL works with Quintiles, clubs and players, the NFLPA, the Competition Committee and medical advisors to understand what the data means and what additional information is needed in order to answer the open questions and make

appropriate changes in an effort to reduce head injuries.

## Rule Changes Strengthen Protection

Since 2002, the League has made 42 rule changes intended to eliminate dangerous tactics and reduce the risk of injuries, especially to the head and neck.

In 2016, NFL owners approved three rule changes addressing safety from multiple angles: the defensive zone, special teams and protocols for holding. After years of progressive limitations, the chop block rule was completely eliminated. “This is a pure defensive player safety rule we think it’s time to pass, and we’re happy it did,” said Atlanta Falcons President and CEO, Rich McKay.

In the kicking game, the League approved a one-year adjustment of the touchback rule, which moves the ball

to the 25-yard line instead of the 20. The intent: create a greater incentive for touchbacks to try to reduce the likelihood of injury on that play. The League also expanded protections related to the horse collar tackle, noting the risk when a defensive player tackles a ball carrier by grabbing him at the nameplate or higher on the jersey.

## Robust Teams Enhance Medical Support

These rule changes continue an aggressive history of player

protections. On average, 29 expert healthcare providers are on hand for every NFL game to provide care to players.

In conjunction with the NFLPA, the League added independent medical personnel and adopted new technologies to assist in the identification and review of injuries, with a specific emphasis on concussions.

These professionals include unaffiliated neurotrauma consultants (UNCs) and Visiting Team Medical Liaisons (VTMLs). Added in 2013,

UNCs—leading concussion specialists, often neurosurgeons, in their communities—provide team physicians with an additional resource for identifying, screening and diagnosing potential concussions. VTMLs (local state-certified physicians) were added in 2015 to help visiting teams traveling out of state meet their medical needs, from prescriptions to immediate access to first-rate medical facilities.

The NFL first added independent certified athletic trainers (AT) as spotters in 2012 and an additional AT spotter for every game in 2016.

# THE TEAM BEHIND THE TEAM

## 29 TOTAL GAME DAY MEDICAL STAFF

### ON AVERAGE EACH TEAM HAS:



**4 ATHLETIC TRAINERS**  
Assess and treat player injuries in conjunction with team doctors



**2 PRIMARY CARE PHYSICIANS**  
Evaluate players for general medical conditions and concussions



**2 ORTHOPEDISTS**  
Evaluate and treat players for injuries to the bones and joints



**1 UNAFFILIATED NEUROTRAUMA CONSULTANT**  
Evaluates players for possible head injuries and concussions



**1 CHIROPRACTOR**  
Provides back/spinal adjustments for players and treats muscular injuries

### STADIUM MEDICAL TEAM:



**2 INDEPENDENT ATHLETIC TRAINERS**  
Notify on-field medical staff of possible injuries from press box. The independent AT spotters can call a medical timeout to stop the game to have a player receive medical attention



**1 RADIOLOGY TECHNICIAN**  
Takes x-rays of injured players at the stadium



**1 DENTIST**  
Treats dental issues



**2 EMTS/PARAMEDIC CREW**  
Transport players to hospital in the event of serious injuries



**1 OPHTHALMOLOGIST**  
Treats eye injuries



**1 VISITING TEAM MEDICAL LIAISON**  
Local emergency physician certified to practice medicine in the state where the game is being played. The VTML works with the team to provide access to care, medication and first-rate medical facilities



**1 AIRWAY MANAGEMENT PHYSICIAN**  
Provides emergency intubation to severely injured, non-breathing players

Information provided by the National Football League Physicians Society (NFLPS). Numbers reflect the average number of medical staff present and should not be considered official NFL protocol.



AP Photo | Aaron M. Sprecher





Spotters communicate with team medical personnel about potential injuries with the twin goals of ensuring that players receive prompt medical attention and preventing potential additional injuries.

The medical timeout, which took effect in 2015 and was used five times in the 2015 season, gives AT spotters positioned high above the field the power to alert a referee to call a timeout if they see a player needing assistance. These “eyes in the sky” observe play on the field and watch the broadcast feed and network footage of the game, with access to all camera angles viewed by the replay official.

NFL AT spotters must meet several standards to prove their medical expertise and cannot have been employed by a NFL team in the past 20 years.

## A Landmark Agreement Reinforces Concussion Protocols

In further efforts to protect the health and safety of NFL players, the NFL and NFLPA in July 2016 announced a new policy to enforce the NFL Game Day Concussion Protocol and discipline clubs that violate it. The NFL Game Day Concussion Protocol addresses the diagnosis and management of concussions. The NFL and NFLPA consistently review the Concussion Protocol and make necessary changes to ensure players are receiving care that reflects the most up-to-date medical consensus.

Under the new policy, the NFL and NFLPA will follow a strict and fair process to investigate incidents and determine appropriate discipline, including club fines and possible forfeiture of draft picks.

Under the Protocol for diagnosis:

- If the team medical staff, a coach, a fellow player, an Unaffiliated Neurotrauma Consultant (UNC) and/or an Independent Certified Athletic Trainer “eye in the sky” spotter sees possible concussion, the player is removed from play.
- The team physician and UNC review game video and conduct a standardized NFL Sideline Concussion Assessment.
- If warranted, the player is escorted to the locker room for comprehensive concussion evaluation by the team physician and UNC.
- If the player is diagnosed with a concussion, the player must remain in the locker room and is prohibited from returning to practice or play.


View the complete Protocol at [NFL.com](http://NFL.com).





AP Photo | Ric Tapia


# CONCUSSION PROTOCOLS


## GAME DAY DIAGNOSIS

- 

Team medical staff, coach, official, fellow player, Unaffiliated Neurotrauma Consultant (UNC) and/or Independent Certified Athletic Trainer “eye in the sky” spotter sees possible concussion
- 

Player removed from play
- 

Team Physician and UNC review game video and begin standardized NFL Sideline Concussion Assessment
- 

If warranted, player escorted to locker room for comprehensive concussion evaluation by Team Physician and UNC
- 

If diagnosed with a concussion, the player must remain in the locker room and is prohibited from returning to practice or play

## RETURN TO PARTICIPATION

- 

**Rest and Recovery:** The player is prescribed rest until his signs and symptoms and neurologic examination, including cognitive and balance tests, return to baseline status
- 

**Light Aerobic Exercise:** Under the direct oversight of the team’s medical staff, the player should begin graduated cardiovascular exercise and may also engage in dynamic stretching and balance training
- 

**Continued Aerobic Exercise and Introduction of Strength Training:** The player continues with supervised cardiovascular exercises that are increased and may mimic sport specific activities, and supervised strength training is introduced
- 

**Football-Specific Activities:** After the player has established his ability to participate in non-contact football activity without recurrence of signs and symptoms and his neurocognitive testing is back to baseline, the Team Physician may clear him for full football activity involving contact
- 

**Full Football Activity/Clearance:** Upon clearance by the Team Physician, the player must be examined by an Independent Neurological Consultant (INC), who is appointed by the NFL and NFLPA. If the INC confirms the concussion has resolved, the player is cleared for full participation

# Equipment Testing and Instructional Videos Add Player Education to the Game Plan

What should players consider when selecting gear for practice and play?

The NFL and NFLPA provide a number of resources to help players make informed decisions.

Through the Head, Neck and Spine Committee, the NFL—in partnership with the NFLPA—assembled a team of engineers, biomechanical experts and materials scientists to

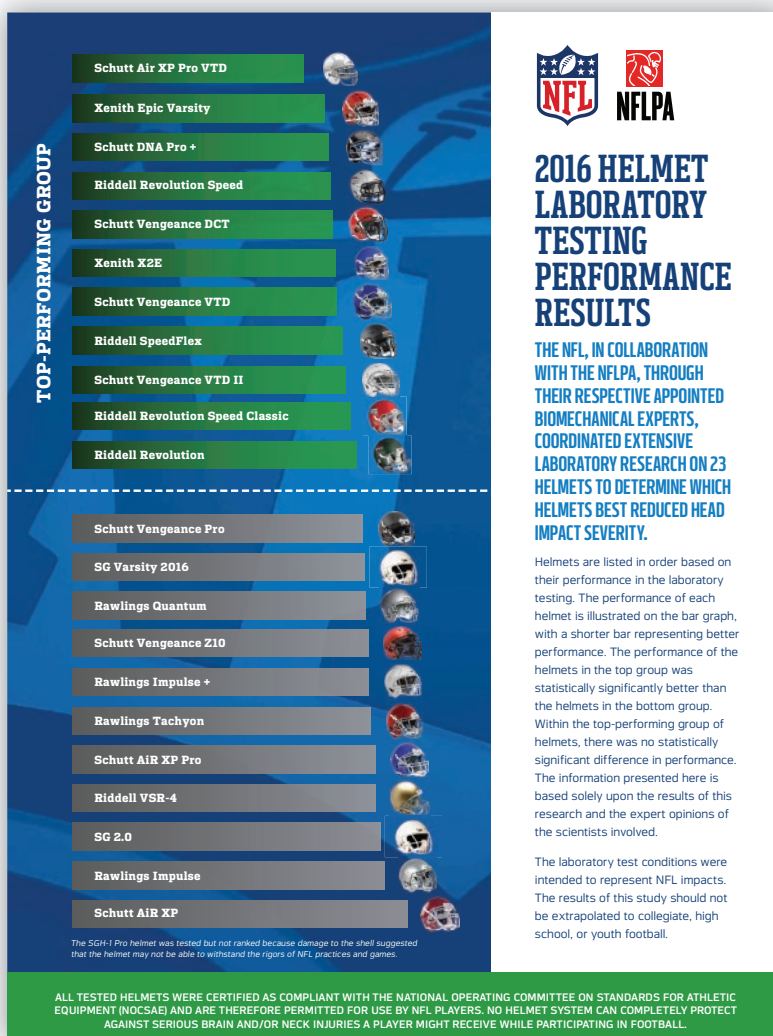
comprehensively analyze the football helmets worn by NFL players.

Under laboratory conditions that simulated certain on-field conditions, researchers evaluated more than 95 percent of the helmet models used by NFL players. Researchers used sensors to measure the impact transmitted through the helmet to the head, then ranked and categorized the helmets based on their ability to reduce impact severity, with a lower score signifying better performance. A poster summarizing these results hangs in all 32 NFL locker rooms.

“The helmet is a critical piece of your protective equipment, and you should decide wisely which helmet you will

rely on,” Thom Mayer, Medical Director of the NFLPA, says in an educational video produced by the NFL. The video was shared with team physicians, athletic trainers and equipment managers and players.

In preparation for the 2016 season, the NFLPA developed an education and training video about concussions in collaboration with the American Academy of Neurology, the American Brain Foundation and current and former NFL players. The video, distributed to all NFL players, explains the facts about concussions and provides guidance and protocols for all players on how to recognize a concussion.



*This poster presenting the findings of the helmet laboratory study was shared with all NFL clubs to help equipment managers and players make informed decisions with regard to their helmet choice.*



AP Photo | Tom Hauck

## EXPANDING KNOWLEDGE ABOUT SHOES AND CLEATS

Injuries to the foot, ankle and the knee cause more lost time in the NFL than any other injuries. To help players make informed decisions, the NFL produced a video detailing the mechanics of common lower limb injuries, proper shoe-fitting techniques and three important criteria for footwear selection: fit, flexion (the bend in a limb, like a toe) and traction.

This guidance draws upon extensive biomechanical tests developed by the NFL Musculoskeletal Committee. For example, a mechanical foot simulating turf toe and Lisfranc injuries tests a shoe's ability to resist toe hyperextension. Researchers also measured the amount of toe extension a player needs during the game to run, jump and cut.

Because excessive loading when a foot hits the turf is a common cause of injury, cleats are another priority area. The Musculoskeletal Committee spent eight years designing a test that represents the force levels generated by NFL players. The test device, called the BEAST, gives very precise information about the traction of a cleat.

Based on these evaluations, each shoe model Nike, Adidas and Under Armour produced for the NFL is given a flexion score, and every cleat receives a BEAST traction score—information shared with players and equipment managers yearly to guide footwear selection.

“For years, we’ve asked ourselves these questions: ‘Should my joints have this much pain? Is my memory normal? Should I be concerned about my heart health?’ TeamStudy will allow the Harvard researchers to answer these questions and share the facts with all of us.”

Dat Nguyen, former NFL linebacker, [footballplayershealth.harvard.edu](http://footballplayershealth.harvard.edu), March 17, 2016

## HIGHLIGHT REEL



# NFLPA

### NFLPA PROGRAMS DELIVER INSIGHT AND SUPPORT

On March 17, 2016, as part of the **Football Players Health Study at Harvard University**, the NFLPA launched TeamStudy, a free iPhone research app designed to shed more light onto player health issues such as memory loss, balance, heart health, pain and mobility for better diagnostics and interventions.

Participants enroll through an interactive consent process and complete tasks and surveys directly through their iPhone. Former NFL players helped design and test the app, which was built using Apple’s ResearchKit open source software.

TeamStudy is just one way the NFLPA assists players after their time in the League. **The NFLPA Trust**, established in 2014, delivers resources, programs and services to provide former players with the support, skills and tools to help ensure success off the field and in life after football.

## Ongoing Programs Provide Healthy Connections for Life

The NFL’s commitment to health and safety continues long after a player has left the game. Retired players receive support throughout their lives from a range of resources tailored to promote long-term well-being. These include:

- **The NFL Neurological Care Program:** Evaluation and treatment of potential neurological conditions, free for former players covered by the NFL Player Insurance Plan.
- **The NFL Joint Replacement Program:** Medical and financial resources for hip, knee or shoulder joint replacement surgeries.
- **Long-Term Care Insurance:** Free for players 50 years or older who meet underwriting requirements. Dating back to the program’s inception in 2011, 1,704 current policies are in place totaling \$4,608,322 paid in premiums entirely by NFL clubs.
- **The NFL Life Line:** A free, confidential, independently operated resource launched in 2012 that connects callers with trained counselors who can help individuals work through any personal or emotional crisis.
- **The NFL Healthcare Information Hotline:** A resource launched in 2013 that connects former NFL players with trained specialists familiar with NFL resources and the Affordable Care Act.
- **The National Football League Alumni Association:** Composed mainly of retired NFL players, coaches, professionals and Associate members, the Association offers a variety of medical, financial, educational and social programs to keep members and their families healthy, productive and connected.
- **The NFL Player Care Foundation (PCF):** An independent organization established in 2007 dedicated to helping former NFL players improve their quality of life, PCF provides retired players assistance in two major areas: financial grants and its Healthy Body & Mind Screening Program. More than 4,000 former players have taken part in these screenings since 2007.



AP Photo | Ted S. Warren



AP Photo | Andrew Weber



AP Photo | Johnny Vy

According to a May 2016 study by the CDC's National Institute for Occupational Safety and Health (NIOSH), NFL players are at no greater risk of suicide compared with the general U.S. population.

In fact, the suicide rate among former professional players in the time period studied was less than half of what would be expected compared with the greater population of similar race and age.

## Vital Support

For the benefit of retired players, the NFL reached an historic settlement with NFL retirees and their families. The settlement provides significant monetary awards to former players diagnosed with dementia, Amyotrophic Lateral Sclerosis (ALS), Parkinson's disease and Alzheimer's disease, without regard to whether the conditions are suspected to be caused by playing professional football. It also compensates for neurocognitive and neuromuscular impairments without regard to whether the conditions are suspected to be caused by CTE.

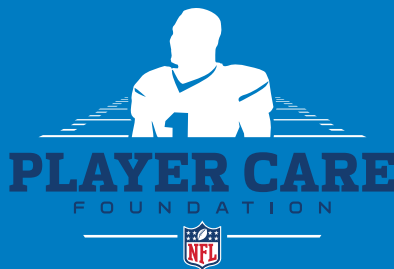
The League is eager to begin implementing the terms of this settlement as part of its ongoing commitment to support former players through a variety of health and wellness programs.

### HIGHLIGHT REEL

#### BOOSTING HEALTH, SAVING LIVES

The Player Care Foundation delivers its Healthy Body and Mind Screening Program in partnership with the NFL Alumni Association and Tulane University School of Medicine. Ten times a year, comprehensive health screenings give former NFL players insights into their health—including information that could save their lives. Services include:

- Blood pressure and body measurements
- Cardiovascular medical histories
- Unique cardiovascular blood tests
- Echocardiography (echo) and electrocardiogram (EKG) screenings
- Sleep apnea risk measurements
- Mental health education and resources





# SHARING PROGRESS

AP Photo | Scott Boehm

**From school playing fields to special events at the Super Bowl, the NFL works with programs and partners across the country that seek to improve the way the game is taught and help all youth lead healthier, more active lives.**

## Heads Up Football Emphasizes the Right Way to Play



When it comes to learning the fundamentals of safer game play, sooner is better. That's the impetus

behind **Heads Up Football**, a program created by USA Football as part of a \$45 million grant from the NFL Foundation. The goal: to set the standard in education and teach coaches and other leaders—and through these efforts, players and their parents—ways to improve safety in youth and high school football.

The program teaches proper tackling and blocking techniques and certifies coaches on safety fundamentals. Coaches learn Centers for Disease Control and Prevention (CDC) concussion recognition and response;

sudden cardiac arrest protocols; heat preparedness and hydration; and instruction on proper helmet and shoulder pad fitting.

In February 2015, USA Football released new youth tackle football practice guidelines, including clear definitions of contact and time limits on full player-to-player contact. These guidelines have been endorsed by

leading medical organizations and the National Federation of State High School Associations (NFHS).

Today, more than two-thirds of youth leagues across the country, including Pop Warner leagues, have enrolled in Heads Up Football. In all, these teams represent a total of more than one million young athletes.

### HEADS UP FOOTBALL (HUF) AREAS OF FOCUS:



**Coaching Certification:** HUF maintains the sport's only nationally accredited courses with content created by football experts and health professionals.



**Concussion Awareness:** HUF has partnered with organizations such as the CDC to develop resources to help coaches and parents become educated on what to look for on the field and to encourage attention to concussion symptoms.



**Equipment Fitting:** HUF teaches coaches, players and parents how to properly fit helmets and shoulder pads for higher levels of safety. Improperly fitted equipment can place an athlete at greater risk of injury.



**Heads Up Tackling and Blocking:** HUF employs two five-step series that teach the fundamentals to address proper tackling and blocking techniques with a focus on reducing helmet contact.



**Player Safety Coach:** HUF trains Player Safety Coaches to ensure compliance with core HUF health and safety protocols, including coaching certification and conducting safety clinics for coaches, parents and players.



**Heat and Hydration:** HUF deploys targeted education for coaches and parents to increase prevention, recognition and basic treatment of athletes for heat-related illnesses.



**Sudden Cardiac Arrest:** HUF has recently included sudden cardiac arrest protocols as part of the program. Sudden cardiac arrest is the leading cause of young athlete fatalities during exercise across all sports.

Master trainers play a pivotal role in the program's success. These top high school football coaches and former NFL and college players bring invaluable knowledge and insight from competing at the sport's highest level. They lead half-day instructional sessions in areas including blocking, tackling, equipment fitting, Centers for Disease Control and Prevention (CDC)-approved concussion response and more. NFL Ambassadors also visit youth practices and games to strengthen awareness and reinforce Heads Up Football's messages and standards.

In the 2015-2016 season, a record-setting 220-plus professional players served as Heads Up Football master trainers and ambassadors—triple the number since the program's inception in 2013.

## Marking Milestones

By making Heads Up Football training mandatory for coaches for the 2016 season, the Oregon School Activities Association set a precedent—becoming the country's first state high school activities association to enact such a requirement.

"This is an opportunity for high school coaches to set a standard for the youth leagues in their communities across the state," Dr. Michael Koester, chairperson of the Oregon School Activities Association's Sports Medicine Advisory Committee, said in a June 2015 announcement. "As a team physician and the parent of a high school football player, I'm excited about Heads Up Football."

**"This is a collaborative effort involving coaches, directors of student activities, athletic trainers, and student activities and athletics staff members."**

**Bill Curran, Director of Student Activities and Athletics Programs, Fairfax County Public Schools, September 2015**

On the other side of the country, Heads Up Football's first adopter, Fairfax County Public Schools (FCPS) in Virginia, reported a milestone of its own: a decrease in the number of injuries and concussions reported by student athletes.

Over the past two years, FCPS football coaches have used tackling mechanics aimed at reducing helmet contact, CDC concussion recognition and response protocols and proper

helmet and shoulder pad fitting. In addition, FCPS has expanded Heads Up Football fundamentals to other sports, including boys and girls lacrosse.

"Coaches in several sports are taking the initiative to identify, evaluate and implement a variety of injury prevention programs in their sports," Bill Curran, Director of Student Activities and Athletics Programs, said in a September 2015 announcement. "We are encouraging coaches to make thoughtful and informed decisions when developing practice plans and implementing drills and activities during practice."

"This is a collaborative effort involving coaches, directors of student activities, athletic trainers and student activities and athletics staff members," Curran said. "With everyone focused on the same goal, we hope to see the numbers of concussions and injuries drop even further."

### HIGHLIGHT REEL

#### PEDIATRICIANS GROUP DELIVERS GUIDANCE

In a policy statement announced at its National Conference and Exhibition in October 2015, the American Academy of Pediatrics (AAP) made several recommendations including:

- Officials and coaches must enforce the rules of proper tackling, including zero tolerance for illegal, head-first hits.
- Players must decide whether the benefits of playing outweigh the risks of possible injury.
- Non-tackling leagues should be expanded so athletes can choose to participate without the injury risks associated with tackling.
- Skilled athletic trainers should be available on the sidelines, as preliminary evidence shows they can reduce the number of injuries for players.



# NFL FLAG Gets More Youth on the Field



Get more kids active and you'll help more kids thrive. In 2014,

the NFL, USA Football, GENYOUth and Fuel Up to Play 60 joined forces under this shared vision to establish the **NFL FLAG Essentials** program.

By providing elementary schools with kits of footballs, flag belts, posters and educational materials for physical education teachers, the NFL FLAG football program teaches teamwork, strategy and sportsmanship while introducing kids to physical activity and healthy lifestyles.

In April 2015, the NFL FLAG program expanded to serving one million students at 2,500 schools nationwide, powered by a grant from the NFL Foundation. And, in April 2016, the Foundation renewed its commitment with a grant that enabled the distribution of NFL FLAG Essentials Kits to 4,000 schools nationwide, reaching 1.5 million new students.

“The NFL FLAG program has been successful in part because it’s dynamic, strategic, challenging, safe and fun, and it teaches kids of all different abilities teamwork, resiliency and respect,” GENYOUth CEO Alexis Glick said in an April 2016 announcement.

In 2016, several Super Bowl 50 events put a spotlight on FLAG football:



AP Photo | LM Otero

## SPOTLIGHT ON FLAG FOOTBALL DURING SUPER BOWL 50

Special Olympics of Northern California and the San Francisco 49ers hosted a Special Olympic Skills and Drills Clinic and FLAG Football scrimmage, introducing the joy of football and techniques of safe play to even more young players.

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NFL FLAG teams representing each of the League’s 32 clubs competed in a championship tournament.

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At the first-ever NFL Women’s Summit, the NFL Foundation committed to working with the Women’s Sports Foundation to distribute 200 NFL FLAG Essentials Kits to organizations throughout the country that serve girls.

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Since the program’s inception, more than three million students have gotten active through NFL FLAG, empowered by NFL FLAG Essentials Kits in more than 8,500 schools representing all 32 NFL club markets.



## Athletic Trainer Initiative Expands Access to Important Expertise

Athletic trainers (ATs) bring significant health benefits to student athletes, according to a study presented in 2012 at the American Academy of Pediatrics (AAP) National Conference and Exhibition. These include lower injury rates, fewer recurring injuries and improved concussion diagnosis.



However, financial realities make ATs a rarity at too many schools, especially in underserved areas. According to the AT Benchmark Study released by the National Athletic Trainers' Association (NATA) and the Korey Stringer Institute (KSI), nearly two-thirds of high schools do not have a full-time AT, and nearly 30 percent do not have any access to an AT.

In 2013, the Chicago Bears worked to place an athletic trainer at every Chicago Public High School football game. The following year, the Bears and 15 other NFL teams followed suit through the NFL Foundation club matching grant program, setting a major movement in motion.



To date, 20 NFL teams and the NFL Foundation, with partners NATA and the Professional Football Athletic Trainers Society (PFATS), have developed programs that have supported an estimated 600 underserved schools and nearly 160,000 youth with the provision of athletic trainers.

**“The Professional Football Athletic Trainers Society is proud to partner with the NFL Foundation, NATA and Gatorade to increase the number of athletic trainers available to high school students across the country.”**

**Rick Burkholder, PFATS President and Head Athletic Trainer of the Kansas City Chiefs.**  
NFLFoundation.org, October 14, 2015

## GAINING MOMENTUM

**GATORADE** THE SPORTS FUEL COMPANY In October 2015, the NFL Foundation and NATA joined together again—now with Gatorade—to launch the **Athletic Trainer Initiative**. This nationwide contest gave high schools the opportunity to earn funding for an athletic trainer. Fifteen winners were announced in March 2016 at the seventh-annual Youth Sports Safety Summit, hosted by NATA and the Youth Sports Safety Alliance.

These schools, serving nearly 5,000 student athletes in total, each received \$50,000 for developing or expanding athletic training programs. Nine additional high schools received educational materials and a Hydration Starter Kit from Gatorade.

“This program has brought us one step closer to the ultimate goal of having a full-time athletic trainer in every high school in the country,” Jeff Kearney, head of Gatorade Sports Marketing, said at the March 15, 2016, announcement.

In 2016, the NFL plans to expand its efforts to fund athletic trainers at high schools that need them through a pilot grant program in Arizona, Illinois, Oklahoma and Oregon. The long-term goal: to raise awareness about the important role athletic trainers can play in high school athletics.

# A Proactive Partnership Recognizes Progress

Seventeen schools, one full-time athletic trainer in each by 2020—that’s the goal for Duval Public Schools in Florida. The NFL and the Jacksonville Jaguars are working together with the Jacksonville Sports Medicine Program to make it happen.

Five schools already have athletic trainers and two more are adding them in the 2016-2017 school year. “We have heard positive feedback from student athletes and their

**“With the NFL and Jacksonville Jaguars as our partners, we can truly impact our community and student athletes.”**

**Robert Sefcik, Executive Director, Jacksonville Sports Medicine Program, jaguars.com, April 1, 2016**

parents,” Duval County Public Schools Superintendent Dr. Nikolai Vitti said in an April 2016 announcement.

Through the efforts of the Jaguars Foundation, the project received an

initial \$50,000 matching grant from the NFL in 2015. It received a second \$50,000 matching grant from the League in 2016.

“Through Project 17, the Jacksonville Sports Medicine Program has crafted a proactive, evidence-based approach to getting student athletes the medical supervision they need and deserve, which can serve as a model for other communities in the U.S.,” said NFL Commissioner Roger Goodell, who accepted the program’s inaugural Leadership in Sports Health, Safety and Research award on behalf of the League on April 1, 2016.



**NEARLY TWO-THIRDS**  
OF HIGH SCHOOLS DO NOT HAVE A FULL-TIME ATHLETIC TRAINER

## HIGHLIGHT REEL

### 2016 ATHLETIC TRAINER INITIATIVE WINNERS

- ↘ Alden-Conger Public School (Alden, MN)
- ↘ Attica Central School (Attica, NY)
- ↘ California Lutheran High School (Wildomar, CA)
- ↘ Canyon Ridge High School (Twin Falls, ID)
- ↘ Carlisle High School (Henderson, TX)
- ↘ John Muir High School (Pasadena, CA)
- ↘ Lutheran High School (Chula Vista, CA)
- ↘ Marist High School (Bayonne, NJ)
- ↘ Mount St. Michael Academy (Bronx, NY)
- ↘ Orrick R-XI High School (Orrick, MO)
- ↘ Pleasant Valley High School (Chico, CA)
- ↘ St. Anthony Village High School (Minneapolis, MN)
- ↘ St. Thomas More High School (Rapid City, SD)
- ↘ Walpole High School (Walpole, MA)
- ↘ William V. Fisher Catholic High School (Lancaster, OH)



AP Photo | Larry French

“The best part that came out of this is empowering parents. Like, ‘Hey you can be helpful. You can know what to look for and what to do. You don’t have to panic.’ It was just really nice to see.”

Erin Cernuda, Head Athletic Trainer, Miami Sunset Senior High School, Miami, Florida

## The Back to Sports Program Empowers Parents



As families encourage their children to be active and participate in athletic activities, sports-related injuries remain a concern. The NFL is committed to equipping parents with the best available information for making decisions about their children’s participation.

In 2014, the **American Heart Association (AHA)** and the NFL created Back to Sports, a program that equips athletic trainers with the resources to conduct educational

seminars about sports safety and youth health and wellness.

Through Back to Sports, athletic trainers (ATs) lead sessions covering concussion awareness, proper responses to cardiac arrest and ways to prevent heat-related illnesses, dehydration and overuse injuries.

“A lot of parents might not know how to deal with this stuff other than consulting Dr. Google,” Athletic Trainer Michelle Godek told the

*News-Herald* in northeastern Ohio in February 2016. Godek led a Back to Sports session for the Brentmoor Elementary School, where she also serves as president of its Parent-Teacher Association.

In the 2015-2016 school year, the Back to Sports program awarded 100 mini-grants to athletic trainers nationwide to deliver important sports safety information to their communities. In the coming year, the program is aiming to fund even more events.



# EDUCATION & ADVOCACY

AP Photo | Matthew Hinton

**Knowledge is power, and even more so when it's shared. The NFL is continually forging connections so valuable findings and practices can be exchanged among health professionals, sports organizations and society as a whole.**

## A Pioneering Health and Safety Institute Breaks Ground

### UW Medicine SPORTS HEALTH AND SAFETY INSTITUTE

On August 15, 2015, the **University of Washington School of Medicine** announced a first-of-its-kind initiative: a **Sports Health and Safety Institute** committed to research, education and advocacy for the prevention and treatment of sports-related concussions and other critical areas of athlete health.

The Institute, supported by a foundational donation of \$2.5 million from the NFL Foundation, will focus first on the issue of concussion by:

- **Advocating** for sound policies for sports safety
- **Educating** physicians, teachers, coaches, parents, athletes and patients about concussion, the benefits of active youth and how to make sports safer
- **Researching** methods to promote behavioral and cultural change, to assess public health education and study the efficacy of sports concussion policies and laws
- **Developing** strategies to inform and engage the public and the media regarding sports- and recreation-related injuries

The NFL's relationship with UW Medicine dates back to the conceptualization of the Zackery Lystedt Law. In 2006, 13-year-old Zackery Lystedt suffered life-altering injuries when he returned to his junior high school football game following a concussion earlier in the game.

Zackery, his parents, the Brain Injury Alliance of Washington, the Washington Interscholastic Activities Association and others were instrumental in the 2009 passage of the Zackery Lystedt Law, which requires "medical clearance of youth athletes suspected of sustaining a concussion before sending them back in the game, practice or training." By 2014, all 50 states had enacted "return to play" laws modeled after it.

"Concussion and TBI are complex issues we are deeply concerned about and committed to preventing," said NFL Commissioner Roger Goodell. "Providing the foundational donation for the UW Medicine Sports Health and Safety Institute is one step of many that the NFL is taking to address this important topic and is an extension of our work to improve safety for athletes across all age groups. We are confident that UW Medicine will help to make this progress possible."

**“The Institute will help tremendously in forging the path forward and uncovering ways to better engage and educate all interested parties about concussions and discover the best methods to effectively translate learning into behavior change.”**

**Stanley A. Herring, MD, Clinical Professor and Director, UW Medicine Sports Health and Safety Institute and Medical Director, Sports, Spine and Orthopaedic Health, NFL.com, August 14, 2015**

“UW Medicine has already made strides regarding the pathology of concussion and has exceptional strengths in trauma care, orthopedics and rehabilitation—three areas crucial to keeping athletes safe and well,” Paul G. Ramsey, UW Medicine CEO, said in an August 2015 announcement. “We’re very pleased to partner with the NFL to make sure we get to the next level in terms of education and advocacy.”



It’s one of the League’s many collaborations in continuing medical education for physicians nationwide. In January 2016, the NFL announced a partnership with the **Emergency Medicine Foundation (EMF)** to provide a free online course for emergency physicians about concussion assessment and management.

Dr. Joseph Waeckerle led the development of the coursework,

which covers concussion epidemiology, prevention and mitigation, recognition, management, recovery and return to play.

“Early intervention is critical to preventing short- and long-term complications,” Brooks Bock, EMF Chairman, said in a January 2016 announcement. “EMF appreciates the NFL’s support for this important effort to help improve the care of people who have experienced concussions.”

## Partnerships Expand Physician Knowledge

By equipping more physicians with the most current information about concussions, more youth will receive the best care possible and their parents will be better informed about this injury.



In July 2015, the NFL Foundation announced an educational partnership with the **American Academy of Family Physicians (AAFP)** to provide informational materials about concussions to family physicians, their patients and the public.

### HIGHLIGHT REEL

#### NFL COMMISSIONER GOODELL CONTRIBUTES TO YOUTH SPORTS PARTICIPATION PANEL

Youth health and sports were the focus of the day at the September 2015 Industry Leaders Summit of the Sports and Fitness Industry Association (SFIA), the leading global trade association of manufacturers, retailers and marketers of sports and fitness products.

NFL Commissioner Roger Goodell joined speakers from SAP North America, KPMG, Sports Authority and Equinox to discuss sports participation, overuse injuries, the inactivity pandemic and ways to keep kids healthy and active.

One specific area of focus: the dangers of demanding a sports specialization at too young of an age.

“I worry so much about putting pressure on kids that if you don’t commit to a sport by fourth or fifth grade, you’re out of luck,” Goodell said.

“We need to open the doors and make sure everybody has an opportunity to participate at whatever level they can,” said Dr. James Andrews, a panelist and a nationally known orthopedic surgeon.



## THE NFL'S COMMITMENT TO IMPROVING HEALTH AND SAFETY IS ONGOING.

*To learn more about the League's initiatives to advance  
research, protect players and share progress, visit*

**[PLAYSMARTPLAYSAFE.COM](https://www.nfl.com/PLAYSMARTPLAYSAFE.COM)**

AP Photo | Greg Trott

