Methods for Diagnosis and Prognosis
of Mild Traumatic Brain Injuries

RESPONSE DUE DATE: July 1, 2013

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Opportunity
Multiple awards with a cumulative value of up to $10 Million are available

QUESTIONS?

Visit us at www.NFLGEBrainChallenge.com

LINK: Response Template Download

REQUEST DESCRIPTION

GE and the National Football League invite proposals for **technologies and imaging biomarkers that address identification and management of subclinical and mild traumatic brain injury.**

Specific focus areas for this challenge include:

- **Development and validation of imaging and/or sensor based biomarkers** that can aid in the diagnosis and prognosis of mild traumatic brain injury events. These include imaging biomarkers of brain structure, connectivity, function, cognition, neuroinflammation, and molecular markers.
- **Development of new technologies that are more sensitive to small contusions** and injuries that are missed by current technologies; and assessing the long-term chronic impact of these events.
- **Improved algorithms** for the quantification and visualization of markers of brain injury severity and longitudinal change.
- **Algorithms and tools** that link imaging data to clinical, cognitive, and biomechanical data.
- **Models of individual risk** and long-term prognosis and clinical decision support tools using population studies.

- **Robust methods for triaging acute stage events** and developing "Return to Play" guidelines using physiological, molecular, electrical or physical changes in brain or body functions.

BACKGROUND

GE and the NFL have established a joint effort to advance the detection and management of mild traumatic brain injuries. The goal is to help physicians make more accurate diagnoses of brain injury and better predict long-term prognosis of individuals having undergone acute and repetitive injuries. In addition to benefiting athletes who are dealing with brain injuries, the development of technologies under this program will also benefit military and civilian head trauma.

GE and the NFL seek to address the current technical and scientific limitations in achieving better diagnosis of brain injuries and assessment of long-term chronic impact. For example, technological advancements are needed to develop and validate biomarkers that quantify disease severity and predict long-term outcomes from repetitive injuries. Better algorithms also are needed to identify and analyze subtle changes of morphology and function in the brain. A better understanding of the molecular, physiological and behavioral/biomechanical changes that occur shortly after a traumatic event is needed to reliably diagnose

the types of changes that are difficult to identify using current technologies.

GE and the NFL look forward to receiving any information consistent with the listed specifications that will aid in advancing the detection and treatment of acute head trauma, and long-term effects of mild, repetitive brain injury.

APPROPRIATE RESPONSES TO THIS REQUEST

Responses from companies (small to large), academic researchers, other research institutes, consultants, venture capitalists, entrepreneurs, or inventors are welcome.

Appropriate responses will use the proposal template and address the following:

- **Brief non-confidential description** of proposed technology including:
  - Discussion of the scientific background supporting the proposed technology
  - Preliminary evidence supporting your approach
  - Technical maturity of approach
- **Expertise and capabilities** of responder (include any relevant prior projects or experiences)
- **Intellectual property status**

EVALUATION CRITERIA

GE and the NFL will assess the proposals using the following **Assessment Criteria:**

1. **Potential to improve the diagnosis or prognosis of mild traumatic brain injury**: The proposed technology must demonstrate clear potential to advance current medical practice for diagnosing early stage mild brain injury or for accurately predicting or quantifying long-term prognostic impact of repetitive mild injury.

2. **Appropriate technologies**

Acute Stage Diagnosis for Return to Play Guidelines: Technologies for identifying and quantifying early physiological, molecular, electrical or physical changes in brain or body functions that reliably diagnose brain injury. Technology that is portable enough to be used on the playing field or sideline is desirable. **These technologies include but are not limited to the measurement of**:
- Abnormal cerebral electrical activity and blood flow
- Abnormal cognitive or other brain function
- Abnormal biomarkers in the blood as detected by portable scanners or rapid biochemical analysis
- Abnormal skeletal motor function
- Abnormal eye or pupil function
- Abnormal visual cues

Diagnosis and prognosis: Technologies that can improve the identification and analysis of brain injuries and accurately detect changes longitudinally to monitor the patient's recovery/prognosis are encouraged. **These technologies can reside in a hospital or doctor's office and can include but are not limited to:**
- Improvements in current brain scanning technology (e.g., CT, MRI, PET, Ultrasound, EEG, MEG, EIS)
- Improved imaging methods that enhance the identification of abnormal brain structure or function.
- Identification and/or detection of novel biomarkers of brain injury
- Developing diagnostic tests to identify individuals who are predisposed to developing long-term brain damage

Analytics Tools and Algorithms to measure, and analyze patient data from the time of injury through each scan during the recovery process: Responses for informatics systems that can be adapted from data-intensive applications outside the medical field are encouraged. For example, modification of data analytics approaches such as those used to track and analyze financial transactions, internet traffic, global supply chains, weather, astronomy, or other data-intensive applications are welcome to apply.

For algorithm proposals, the following special guidelines and evaluation criteria apply:
- Respondents cannot disclose their algorithms or any proprietary detail about the algorithms
- Respondents must state that they own the right to use and apply the algorithms for this challenge
- Responses will be evaluated based on the following:

  - Case studies showing performance data and accuracy results on the algorithm's performance on other applications
  - High-level description of the benefits, methods, and techniques employed by the algorithm
  - Description of ongoing research/development
  - Proposed program plan on how they will apply the algorithm to this topic
  - Relevant background on the team/organization/lab submitting the response

3. **Timeframe:** Technologies that can demonstrate proof of concept within 1 - 2 years are preferred.

However, game changing technologies will be strongly considered if good progress towards proof of concept and utility can be shown within 1 - 2 years.

RESPONDING TO THIS CHALLENGE

By submitting a response, respondents agree to all of the following submission requirements, including confidentiality, selection, and the review processes:

Respondents agree to the submission terms described in the response template

Confidentiality
Respondents confirm that their submissions do not contain any confidential information.

Selection and Review Process
All judging, eligibility and award decisions are final, not subject to review and at the sole discretion of the judges, GE, and the NFL.

The judging panel will be convened to ensure relevant expertise and diversity of perspectives. The judges can be viewed at the challenge website.

Awards
A total of up to $10 Million will be awarded by GE and the NFL as described below:

Algorithms and Analytic Tools:
Phase 1 Guided Funding: Up to 10 awards at a maximum of $100,000/award to develop proof of concept

At the completion of Phase 1 there may be opportunities to discuss additional business relationships including the purchase or license of a compelling algorithm

Biomarkers and all other technologies:
Phase 1 Guided Funding: Up to 20 one year awards at a maximum of $300,000 to develop proof of concept

Phase 2 Guided Funding: Up to 6 one year awards for continued funding of up to $500,000 to continue developing the most promising Phase 1 proof of concept results

At the completion of Phase 2 there may be opportunities to discuss additional business relationships including the purchase or license of a compelling technology

Guided Funding Awards

The initial round of cash Awards will be offered by GE and the NFL (the Sponsors) to Entries selected by the Judges and will be disbursed in two equal installments. The first installment of the initial round of the cash Award will be disbursed after the potential winner meets with the Sponsors and agree upon a plan for guided funding.   A progress report from the awardee will be required 6 months from the first installment disbursement date, and the second installment of the initial round of the cash Award will be released following receipt by the Sponsors of the progress report. A final report summarizing the results and comparing the outcomes to the proposed results will be due at the end of the Award period in order to be considered for the final round of cash Awards.

All cash Awards are a one-time offer and there is no offer of licensure, royalty, or other financial compensation implied beyond the initial round of cash Awards.

Please see the website for full details on the Head Health Challenge Terms and Conditions.