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- [ ] Women's Health & Gender Biology

If you selected 'other' please specify your research area:

Title*  Information Extraction from Electronic Medical Records

Authors*  PI*
Shervin Malmasi, Nicolae L. Sandor, Naoshi Hosomura, Matt Goldberg, Stephen Skentzos, Alexander Turchin  Alexander Turchin

Abstract Body (MUST be limited to 200 words, anything beyond 200 words will be truncated for print)*
Narrative clinical data (e.g. provider notes) contains vast amounts of information that could be used in clinical research by employing natural language processing (NLP) technology. Nevertheless, it remains underutilized, in part because the
technical skills required for the development or use of NLP software are a major barrier for medical researchers wishing to employ these methods. To remedy this situation, we have developed Canary, a free and open source solution designed for users without NLP or software engineering experience. The software allows users to model their target information using lexicons and grammar rules, ranging from simple to complex. It was designed to be fast and work out of the box via a user-friendly graphical interface. The software runs on any contemporary Windows-based computer and supports both 64-bit architecture and parallel processing. Canary takes as input plain-text files (that can be exported from most EMR systems) and outputs delimited files that can be imported into any analytical package. Canary supports language models that can extract individual concepts (e.g. Patient continues to smoke.), concept-value pairs (e.g. Blood pressure is 120/70) as well as concepts distributed across sentences (e.g. Tried Lipitor. Had muscle aches again.). Canary is available free of charge upon request.

Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background. *
Electronic Health Records (EHR) have been widely adopted in the last two decades, containing vast amounts of patient information. This has greatly increased the amount of digital data available to researchers, enabling them to analyze this data in order to formulate and answer sophisticated research questions. However, while some of this information is available as structured data (e.g. checkboxes/predefined forms), the great majority is stored as unstructured data, such as free text written by care providers. Given that these free-text notes contain vital clinical data, this has led to the development of computational methods to process and mine them for information of interest. But this is challenging as the expressive nature of human language means that there are many ways to describe the same medical phenomena, such as experiencing a side effect from a medication. Target topics may also be spread across multiple sentences or be affected by acronyms and spelling errors. We present "Canary", a free information extraction tool designed to address these challenges. A key advantage is that it is a GUI-based software not requiring a technical background. It is designed to enable clinical researchers to extract information from narrative documents without significant time or financial burdens.

Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.*
Canary is a free software that allows users without technical background to extract information from narrative electronic documents. Canary could be used to process data for thousands of patients to obtain information for quality measurement, population management or clinical research.

* 
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- Nursing Research
- Regenerative Medicine
- Pregnancy & Fertility
- Women's Health & Gender Biology
- Trauma
- Other

If you selected 'other' please specify your research area:

Title*
Can Transcranial Direct Current Stimulation (tDCS) Change the Emotional Component of Chronic Low Back Pain (CLBP)?

Authors*
Timothy Y. Mariano, Frederick Burgess, Marguerite Bowker, Jason Kirschner, Richard Jones, Chris Halladay, Michael Stein, Benjamin D. Greenberg

PI*
Timothy Y. Mariano

Abstract Body (MUST be limited to 200 words, anything beyond 200 words will be truncated for print)*
Pain has both nociceptive (sensory) and emotional (affective) components. CLBP remains a significant medical burden; annual prevalence is 15%-45%. Current pain treatments, such as opioid analgesics, can have serious side effects. Limited options (e.g. cognitive behavioral therapy [CBT], biofeedback) exist to address the affective component, which causes significant disability and psychiatric sequelae of fear avoidance, anxiety, depression, and suicide. The emerging neuromodulation technique of tDCS has been applied to the sensory component of pain. We performed a multi-site, double-blinded, randomized placebo-controlled trial of tDCS targeting left dorsal anterior cingulate cortex (dACC) -- a node in the pain network -- in 21 CLBP participants. Each participant received 10 daily sessions of sham or cathodal tDCS (thought to reduce cortical excitability) at 2 mA for 20 minutes. Participants rated pain intensity, disability, and acceptance during and after treatment. Interim analysis did not demonstrate a separation between sham and active tDCS for primary outcome measures (all marginal effect |t|<1.7, p>0.1), but a full analysis is currently underway. Larger, better-powered future studies are needed, and they should consider additional cortical targets, different stimulation parameters, high-density electrode arrays, and multimodal therapy combining tDCS with CBT.

Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background. *

Pain has both sensory and emotional components. Most individuals only experience the sensory component, which quickly resolves as an injury heals. However, for some, pain becomes chronic, such as in chronic low back pain (CLBP). These individuals are often significantly affected by the emotional component, which can include avoidance, anxiety, depression, and even suicide. For CLBP, these emotional symptoms lead to significant disability and reduced quality of life. Most CLBP treatments only address the sensory component; some of these, like chronic prescription opioids, have serious and increasingly-well-known risks. In response, researchers have been developing new treatment methods that address the emotional component of CLBP. Some of these, like cognitive behavioral therapy (CBT), are currently available clinically. Researchers are also exploring novel approaches employing low-intensity electromagnetic fields to change how the brain processes pain-related perceptions and feelings. We conducted a small study investigating if a form of non-invasive electrical brain stimulation called transcranial direct current stimulation (tDCS) can change the emotional component of pain in 21 CLBP patients. An interim analysis did not show a difference in CLBP patients receiving tDCS versus placebo; a full analysis is underway. Larger future studies could consider combining tDCS with CBT.

Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.*

New approaches are needed to address both sensory and emotional components of chronic low back pain. Noninvasive electrical brain stimulation, including transcranial direct current stimulation, is one such possible approach, although further study is needed to assess its potential efficacy.

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If you selected 'other' please specify your research area:

Title*
The biomechanics of anteroposterior axis elongation in the chicken embryo

Authors*
Arthur Michaut, Karine Guevorkian, Olivier Pourquie

PI*
Olivier Pourquie

Abstract Body (MUST be limited to 200 words, anything beyond 200 words will be truncated for print)*
In vertebrates, the elongation of the anteroposterior (AP) axis is a crucial step during the embryonic development that results in the formation of the posterior organs. A previous study from our team put in evidence the importance of the presomitic mesoderm (PSM) in the elongation process and suggested that a gradient of cell motility along the AP axis might be necessary for proper elongation of the chicken embryo (Bénazéraf et al. Nature 2010). To date, the potential interaction between well-established molecular signaling and physical mechanisms involved in the axis elongation remains largely unexplored. For this reason, we investigate the elongation of the chicken embryo by studying the physical properties of the PSM and the forces generated by its elongation. Here, we will present our experimental approaches to assess: (i) the PSM rheology using micropipette aspiration technique and (ii) axis elongation forces using a cantilever force sensor.

Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background. *

We all started as one single cell. This cell contains all the information to make a complex adult body. Developmental biologists try to understand how this cell will first divide to make a dull ball of cells which will then start making dramatic changes of shape to pattern the future organs of the body. With my PhD project, I study one of these very important shape transformations: the formation of the future spine. To do so, I am looking at the chicken embryo because its development is very close to the human embryo’s one and you just need to crack an egg open to collect the embryo and put it under the microscope. Therefore I can very easily make movies of the growing embryo. The goal of my project is to understand which part of the embryo is driving the elongation of the future spine. Before my project, a region with very active cells is responsible for the elongation. To further understand this mechanism, it is important to verify whether these cells really have the strength of deforming the boundary of the body. For this reason, I measure the forces produced by these cells.

Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.*

Understanding how an embryo is shaped has obvious applications for curing congenital malformations. It can be of some help also in the field of regenerative medicine in order to help better shape organs.

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If you selected 'other' please specify your research area:

Title*
Partners Biobank

Authors*
Scott Weiss

PI*
Scott Weiss

Abstract Body (MUST be limited to 200 words, anything beyond 200 words will be truncated for print)*
Researchers and clinicians at Brigham and Women’s Hospital, Massachusetts General Hospital, and other Partners institutions are studying how genes, lifestyle, and other factors affect people’s health and contribute to disease. To do this research, we are asking patients at Partners HealthCare hospitals to participate in
Researchers and clinicians at Brigham and Women’s Hospital, Massachusetts General Hospital, and other Partners institutions are studying how genes, lifestyle, and other factors affect people’s health and contribute to disease. To do this research, we are asking patients at Partners HealthCare hospitals to participate in the Partners HealthCare Biobank (Partners Biobank). This state-of-the-art biobank will help researchers uncover the links between an individual’s genetics, family history, and environment in the development of disease and in people’s response to medications. The Partners Biobank will help bring us one step closer to preventive and personalized medicine. To date, more than 70,000 patients have consented to participate in the Partners Biobank at Brigham and Women’s Hospital, Massachusetts General Hospital, Faulkner Hospital, Newton-Wellesley Hospital, McLean Hospital, North Shore Medical Center, and Spaulding Rehabilitation Network. Samples are maintained in an institution-wide repository which is a growing resource available to Partners investigators and research groups. These samples are available for distribution to Partners investigators with required approval from the Partners Institutional Review board (IRB).

Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background. *

Researchers and clinicians at Brigham and Women’s Hospital, Massachusetts General Hospital, and other Partners institutions are studying how genes, lifestyle, and other factors affect people’s health and contribute to disease. To do this research, we are asking patients at Partners HealthCare hospitals to participate in the Partners HealthCare Biobank (Partners Biobank). This state-of-the-art biobank will help researchers uncover the links between an individual’s genetics, family history, and environment in the development of disease and in people’s response to medications. The Partners Biobank will help bring us one step closer to preventive and personalized medicine. To date, more than 70,000 patients have consented to participate in the Partners Biobank at Brigham and Women’s Hospital, Massachusetts General Hospital, Faulkner Hospital, Newton-Wellesley Hospital, McLean Hospital, North Shore Medical Center, and Spaulding Rehabilitation Network. Samples are maintained in an institution-wide repository which is a growing resource available to Partners investigators and research groups. These samples are available for distribution to Partners investigators with required approval from the Partners Institutional Review board (IRB).

Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.*

The biobank will help researchers uncover the links between an individual’s genetics, family history, and environment in the development of disease and in people’s response to medications. The Partners Biobank will help bring us one step closer to preventive and personalized medicine.

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If you selected 'other' please specify your research area:

Title*
All of Us Research Program

Authors*
Elizabeth Karlson

PI*
Elizabeth Karlson

Abstract Body (MUST be limited to 200 words, anything beyond 200 words will be truncated for print)*
The All of Us Research Program is a historic effort to gather data from one million or more people living in the United States to accelerate research and improve health. By taking into account individual differences in lifestyle, environment, and biology, researchers will uncover paths toward delivering precision medicine. The
mission of the All of Us Research Program is to accelerate health research and medical breakthroughs, enabling individualized prevention, treatment, and care for all of us. By enrolling one million or more volunteers, the All of Us Research Program will have the scale and scope to enable research for a wide range of diseases, both common and rare, as well as increase our understanding of healthy states.

Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background.

The All of Us Research Program is a historic effort to gather data from one million or more people living in the United States to accelerate research and improve health. By taking into account individual differences in lifestyle, environment, and biology, researchers will uncover paths toward delivering precision medicine. The mission of the All of Us Research Program is to accelerate health research and medical breakthroughs, enabling individualized prevention, treatment, and care for all of us. By enrolling one million or more volunteers, the All of Us Research Program will have the scale and scope to enable research for a wide range of diseases, both common and rare, as well as increase our understanding of healthy states.

Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.*

The data collected can be used to develop new medical treatments that are unique to individuals and enable a future of precision medicine for all of us.

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First Name*  Last Name*  Academic Degrees*
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Radiation Oncology

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Twitter Handle (if applicable)

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- Regenerative Medicine
- Women's Health & Gender Biology

If you selected 'other' please specify your research area:
Healthcare Delivery

Title*
Overutilization of brain imaging for staging among patients with stage IA non-small cell lung cancer

Authors*  PI*
Michael Milligan, Ling Li, Aileen Chen  Aileen Chen, MD MPP

Abstract Body (MUST be limited to 200 words, anything beyond 200 words will be truncated for print)*
Among patients diagnosed with Stage IA Non-Small Cell Lung Cancer (NSCLC), the incidence of occult brain metastasis is low. Thus, several professional societies recommend against brain imaging for staging purposes. This study characterized the use of brain imaging among such patients in a nation-wide cancer registry. Utilizing SEER-Medicare data, we identified patients diagnosed with Stage IA NSCLC between 2004 and 2013. Patients were classified as receiving brain imaging if they had a head CT or MRI within 3 months of diagnosis. Among 13,809 patients, 3,567 (25.8%) received brain imaging for staging purposes. Over the study period, the rate of brain imaging increased approximately 2.1% per year. There was significant practice variation across hospital service areas, with rates of brain imaging ranging between 0% and 64.0%. Factors associated with the receipt of brain imaging included older age (OR 1.02, p < 0.0001), non-white race (OR 1.11, p = 0.0170), greater comorbidities (OR 1.11, p < 0.0001), and pathologic T1B classification (OR 1.25, p < 0.0001). Across the US, roughly 1 in 4 patients with Stage IA NSCLC received brain imaging for staging purposes prior to definitive therapy. Closer adherence to clinical guidelines is likely to result in more cost-effective care.

Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background.

Most patients with localized, stage IA non-small cell lung cancer (NSCLC) undergo surgery to remove their tumor—a potentially curative procedure. However, if cancer has spread to other organs, surgery will no longer be curative, and additional therapies, like chemotherapy, are indicated. While it is important for clinicians to investigate whether cancer has invaded other tissues, in the absence of neurological symptoms, the likelihood of brain metastasis from stage IA NSCLC is exceedingly low. Citing unnecessary costs and treatment delays, many professional organizations have recommended against the use of brain imaging for staging purposes in these patients. Our study revealed, however, that this practice is quite common across the United States. Roughly 1 in 4 patients with stage IA NSCLC, included in a national cancer registry, underwent brain imaging. Older, sicker, and non-white patients with larger tumors were more likely to receive brain imaging. The rate of brain imaging varied widely in different areas of the country, reflecting a degree of clinical controversy with the guidelines. Closer adherence to guidelines would likely result in more cost-effective care across the country.

Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.

Currently, there is significant overutilization of cost-ineffective brain imaging for staging purposes in patients with stage IA NSCLC. Reducing this practice could result in more affordable, efficacious cancer care for these patients.
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- [ ] Other

If you selected 'other' please specify your research area:

**Title***
Smart cannabinoid cancer therapy

**Authors***
M Moreau, S Yasmin-karim, R Dabney, A Herman, and W Ngwa

**PI***
Wilfred Ngwa

**Abstract Body (MUST be limited to 200 words, anything beyond 200 words will be truncated for print)**
The purpose of this study was to investigate the use of 1) cannabinoids (CBD) in treatment of the deadliest cancers, and 2) smart biomaterial drone technology for sustained precision delivery of CBD to tumor cells with minimal side effects. CBD was used to treat (A-549) human lung cancer cells in-vitro with and without
radiotherapy at different doses, and clonogenic survival was assessed. Meanwhile, smart radiotherapy biomaterials (SRBs) were loaded with CBD and administered to different cohorts of tumor mice. Survival was compared for mice cohort with pancreatic (panc02) cancer treated with CBD-loaded SRBs, mice cohort directly administered with CBD, and mice cohort serving as control. In-vitro study results showed substantial decrease in survival (7%) for lung tumor cells treated with combined CBD (2 µg) and RT (4 Gy), compared to cells only treated with CBD (70% tumor cell survival) or radiotherapy (50%) at same doses. However, mice with high burden of pancreatic cancer treated with CBD-loaded MRBs had 100% survival by week 4 compared to 50% for control cohort. These preliminary results justify ongoing studies developing smart cannabinoid cancer therapy using smart biomaterials to treat the deadliest cancers with increased therapeutic efficacy.

**Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background.**

The purpose of this study was to investigate the use of cannabinoids (CBD) in treatment of lung and pancreatic cancer with and without radiotherapy. The use of innovative biomaterial drone technology to precisely deliver the cannabinoids sustainably to the tumor cells was also investigated. Results show that cannabinoids can significantly damage lung tumor cells. The damaging effect is even more potent when combined with radiotherapy. Meanwhile animals with high burden of pancreatic cancer treated with cannabinoids delivered by the drone technology showed major increase in survival compared to untreated mice. These preliminary studies indicate major promise for the use of cannabinoids in the treatment of the deadliest cancers. The use of the biomaterial drones could help minimize the side effects that have hampered clinical investigations of cannabinoids for cancer treatment.

**Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.**

Cannabinoids (CBD) can be used to reduce the tumor burden and increase survival in lung and pancreatic cancers, and smart biomaterial drone technology can be used for sustained precision delivery of CBD to tumor cells with minimal side effects.

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- Regenerative Medicine
- Trauma
- Women's Health & Gender Biology

If you selected 'other' please specify your research area:

**Title**
Cortisol Reactivity and Acute Stress in Midlife Women with Vasomotor Symptoms

**Authors**
Margo Nathan, MD, Kathryn A Sullivan, BA, Aleta S Wiley, MPH, Kathleen C McCormick, BS, Julie Camuso, BA, Akanksha Srivastava, MD, Hadine Joffe, MD, MSc

**PI**
Dr. Hadine Joffe

**Abstract Body (MUST be limited to 200 words, anything beyond 200 words will be truncated for print)**
Background: Attenuated cortisol release following provocation experiments occurs in stress conditions like anxiety and indicates abnormal hypothalamic-pituitary-axis (HPA) function. In midlife women, vasomotor symptoms (VMS) are linked with abnormal resting cortisol, but cortisol reactivity to stressful provocation experiments has not been studied. We examined whether women with VMS have altered cortisol release following an experimental stressor. Methods: 37 midlife women with VMS (n=27) and without VMS (n=10) completed the Montreal Imaging Stress Task (MIST), an arithmetic and social stress task. Salivary cortisol and psychological response on a Visual Analog Scale (VAS) were measured pre- and post-MIST. Within-person changes in cortisol and psychological response were compared between groups. Results: Women with VMS had a smaller increase in cortisol than women without VMS (mean increase: 0.02 vs. 0.07 µg/dl; 54% vs. 83% increase, respectively, p=0.039). Mean baseline cortisol (0.10 vs. 0.09 µg/dl) and clock time of assessment did not differ between groups (p=0.32). Women with VMS also reported a diminished stress response than those without VMS (p=0.05). Conclusion: Women with VMS had a blunted cortisol response following an acute experimental stress task, similar to that observed with stress disorders. VMS may be causally related to or a marker of disrupted HPA function.

Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background. *

The hypothalamic-pituitary-axis (HPA) is a hormonal pathway in the brain. The endpoint of the pathway is the release of cortisol (the primary stress hormone). When this pathway is disturbed, often because of medical illness, the amount of cortisol release can be too low or too high. Patients with chronic stress conditions like anxiety or insomnia have altered cortisol release following a stressor. Women experiencing hot flashes during the menopausal transition commonly experience anxiety and sleep disturbance. We investigated whether women with hot flashes also have altered cortisol release patterns and different psychological stress responses than those without hot flashes. Midlife women with and without hot flashes completed the Montreal Imaging Stress Task (MIST), a social stress-provoking experimental task. Cortisol was measured in both groups before and after completing this task. Differences in the average amount of cortisol secreted were compared between groups. Women with hot flashes had a smaller cortisol response following the MIST compared to women without flashes, as well as a smaller psychological stress response. These findings are comparable to the pattern observed in patients with chronic stress conditions. Thus, it is possible that hot flashes may be a marker of disrupted HPA function.

Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.*

Hot flashes are common during menopause. Our study suggests that hot flashes are linked to hypothalamic pituitary axis dysfunction, which occurs in chronic stress conditions like anxiety. Thus, the experience of hot flashes may represent a chronic stress presentation.

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If you selected 'other' please specify your research area:

Title*
Usability Test Results of an Indications-based Computer Provider Order Entry Re-design

Authors*
Isabella Newbury; Pamela Neri, MS; Kevin Kron; Alejandra Salazar, PharmD; Kate Forsythe; Aaron Nathan; Sam Karmiy; Lynn Volk, MHS; Mary Amato, PharmD; Adam Wright, PhD; Tewodros Eguale, PhD, MD; Sarah K. McCord, MLIS, MPH; Gordon Schiff, MD

PI*
Dr. Gordy Schiff
Abstract Body (MUST be limited to 200 words, anything beyond 200 words will be truncated for print)*

Most electronic health records (EHR) currently lack an easy and efficient method of ensuring the medication indication, reason for the medication, is included with the prescription for the clinician, the patient and the pharmacist. The goal of this three-year AHRQ funded study is to re-design computerized provider order entry (CPOE) to increase safety for patients by allowing the indication to take a more prominent role in the prescription order. A prototype CPOE system was created following a user-centered design process involving stakeholder and user participation during each project phase. In addition to starting the order with the indication, the prototype presents drug options based on the patient’s clinical data and the most up-to-date pharmaceutical guidelines. A summative usability test was conducted with the prototype and Epic. Twenty clinician participants completed eight test patient scenarios that involved placing an appropriate medication order, including an indication, with both systems. The scenarios were designed to include both common and more complex problems to test common medication ordering errors. Results show the prototype was more accurate, more efficient, and was liked by physicians. With this new system, enlightened patients are likely to have a safer outcome and clinicians will have a more satisfying workflow.

Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background. *

Most electronic medical record systems do not have a good way to incorporate the indication, or reason for medical prescription, in thedrug order. The indication would help pharmacists confirm why the medication was being prescribed and would allow the patient to see the reason they are taking their medication. This is helpful especially for patients on multiple medications to keep track of their routine. We re-designed the prescription ordering system to improve the way indications are incorporated into the prescription order. We conducted usability tests of this new system and the current system with twenty clinicians. They completed eight test patient scenarios where they had to complete an appropriate prescription order. These results showed that in comparison to the current system the prototype required less time to complete orders, increased accuracy of the patient receiving the recommended medication in accordance to the pharmaceutical guidelines, and reflected an increase in clinician satisfaction. The system has the potential to improve patient safety. Many features of this system support personalize medicine by focusing on the patient’s characteristics to prescribe the right medicine for the right reason at the right dose.

Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.*

This redesigned CPOE would help patients be informed about their medications and help improve patient safety. Starting with the indication helps generate drug suggestions that filters common medication errors, and supports clinicians in prescribing an appropriate drug for their patient.

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- Women's Health & Gender Biology

If you selected 'other' please specify your research area:
Alzheimer's Disease

Title*
Participant Enrollment in REVEAL-SCAN: Risk Education and Evaluation of Alzheimer's Disease – the Study of Communicating Amyloid Neuroimaging

Authors*  
Tiffany Nguyen, Sheila Sutti, Kristin Harkins, Joseph Harrison, L. Adrienne Cupples, Kathleen Welsh-Bohmer, Michelle McCart, Lan Le, Rebecca Ferber, J. Scott Roberts, Jason Karlawish, Robert C. Green for the REVEAL-SCAN Project Team

PI*  
Robert C. Green, Jason Karlawish
Abstract Body (MUST be limited to 200 words, anything beyond 200 words will be truncated for print)*

REVEAL-SCAN is the first multisite randomized clinical trial that explores the impact of learning amyloid imaging results among asymptomatic older adults, and how to safely communicate these results and educate on the risk of developing Alzheimer’s disease (AD). Participants in the study receive an amyloid brain scan and an AD dementia risk estimate based on known risk factors. Half are randomized to learn their amyloid scan result and AD risk at the same visit, while the other half learn their scan results 6 months later. We evaluate cognitive performance, mood, and health behavior before and after risk disclosure between participants who had their initial vs. delayed amyloid disclosure. The study will enroll 270 cognitively normal participants, aged 65-80 years old. We recruit from AD centers, research registries and portals, and clinical trial matching services. Across the four study sites to date, 420 potential participants have spoken with study team members about joining the study. Of those individuals, 306 completed initial screening and 63 enrolled. Enrollment is defined by number of completed brain scans. Ongoing efforts are underway to recruit more participants. This study is imperative to help researchers and clinicians understand implications of amyloid imaging as it becomes increasingly utilized.

Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background. *

Alzheimer’s disease (AD) is a brain disease and the most common form of dementia. Scientists believe the buildup of amyloid, a protein in the brain, is associated with AD-related memory loss. With new imaging technology, it is possible to detect amyloid build-up before AD dementia symptoms appear. REVEAL-SCAN explores the impact of returning amyloid imaging results and risk of developing AD information to adults without AD dementia symptoms. We are enrolling adults without memory loss symptoms between ages 65-80 years old. We recruit from AD centers, research registries and portals, and clinical trial matching services. To date, we have spoken to 420 potential participants about joining the study and 63 individuals have enrolled. The number of completed brain scans defines enrollment. All participants learn their AD risk based on known factors and the results of their brain scan. We study how participants react to, understand, and use the information by randomly assigning participants to either learn their imaging result soon after the scan or 6 months later. We then measure differences in cognitive, psychological, and behavioral outcomes between the two groups. This study is important to understand how best to provide risk information in future research trials and clinical practices.

Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.*

REVEAL-SCAN investigates the novel question: “what is the impact of disclosing amyloid brain imaging results to cognitively normal individuals?” to understand if knowledge of having a biomarker associated with Alzheimer’s disease risk will bias cognitive performance and/or cause psychological distress.

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<td>Research Assistant</td>
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- [ ] Other

**If you selected 'other' please specify your research area:**

**Title**
A Novel Software Method to Assess Joint Space Width in Hand Osteoarthritis

**Authors***
Immanuel Onuoha, Jeffery Duryea

**PI***
Jeffery Duryea

**Abstract Body (MUST be limited to 200 words, anything beyond 200 words will be truncated for print)**

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Osteoarthritis (OA) is a debilitating disorder that causes degeneration of joints in the body. It is the most common form of arthritis; affecting approximately 27 million Americans. Hand osteoarthritis (HAO) in particular restricts individuals from performing modest tasks because of the pain ordinarily associated with this disorder - specifically pain in the joint regions. However, the etiology of the disorder is still not fully understood and there are no known disease-modifying treatments to prevent HAO or slow progression. Hand radiography offers an objective method to characterize joint narrowing, a structural manifestation of HAO. To further understand the disease, we developed a software tool to measure joint space width (JSW) on digital hand radiographs. For evaluation, we used the software to assess JSW change for 288 subjects enrolled in the Osteoarthritis Initiative (OAI) – a large NIH and industry-funded population study of OA. Measurements of the metacarpophalangeal (MCP), proximal interphalangeal (PIP), and distal interphalangeal (DIP) joints for digits 2 to 5 were made. The method is efficient, requiring less than 5 minutes per radiograph. To address the needs of the OAI and future research studies and clinical trials of HAO, improvements to the software to further reduce the reader time are ongoing.

Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background.*

Osteoarthritis (OA) is a debilitating disorder that causes degeneration of joints in the body. It is the most common form of arthritis; affecting approximately 27 million Americans. Hand osteoarthritis (HAO) in particular restricts individuals from performing modest tasks because of the pain ordinarily associated with this disorder - specifically pain in the joint regions. Since the cause of this disorder is not clearly understood, more research is needed in this area. Hand x-rays allow an objective way to understand HAO progression and are a useful resource for research studies. To further address the needs of HAO researchers, we developed a software method to automatically measure the narrowing of the joint space on hand x-rays, an indicator of HAO-related change. This software was used to assess the hand x-rays of 288 patients provided by the Osteoarthritis Initiative (OAI) – a large NIH and industry-funded population study of OA and we found that the method was fast and objective. To address the needs of the OAI and future studies and trials of HAO, we are making improvements to the software to reduce the amount of time it takes the reader to measure a single joint.

Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.*

The JSW software has the potential to serve future research studies and clinical trials of hand osteoarthritis as an efficient resource to provide objective structural outcome measures to quantify the progression of the disease.

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Title*
Motivations and healthcare utilization within a seemingly healthy population undergoing genome sequencing: The Personal Genome Outcomes "PeopleSeq" Consortium

Authors*

PI*
R. Green
**Abstract Body (MUST be limited to 200 words, anything beyond 200 words will be truncated for print)**

The Personal Genome Sequencing Outcomes “PeopleSeq” Consortium, a multi-cohort longitudinal study, aims to understand the largely unknown medical, behavioral, and economic outcomes of returning genome sequencing results to seemingly healthy adults. Data was collected through web-based surveys inquiring about sociodemographics, motivations for pursuing sequencing, concerns when deciding to pursue sequencing, behavioral and medical responses to results, and perceived utility after undergoing sequencing through commercial or research projects. Descriptive statistics were used to examine data from 589 participants. “Curiosity about my genetic make-up” and “interest in finding out about my personal disease risk” were the most important motivators for pursuing sequencing. Less than 13% of participants reported being very concerned about privacy or insurance discrimination. The majority of participants reported discussing their results with a family member (81%) or with a healthcare provider (51%). Less than 13% reported having any follow-up medical tests, exams, or procedures because of their results. A quarter of participants reported that what they learned from their results would help reduce their chances of getting sick. The PeopleSeq Consortium continues to collect data to gain further insight into the medical, behavioral, and economic consequences of genome sequencing within a healthy population.

**Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background.**

Learning one's genetic code, through a process called “genomes sequencing” can help diagnose a genetic disease or predict the risk for future illness. With the cost of testing becoming more affordable and more accessible to the general public, it is becoming increasingly popular for seemingly healthy adults to pursue genome sequencing. However, there is little knowledge about the benefits and risks of returning genome sequencing results in healthy populations. Through the PeopleSeq Consortium, we have developed the first-ever process for collecting data on people’s experiences and outcomes with genome sequencing from multiple sites. Here’s what we’ve learned so far from over 500 people- “Curiosity about my genetic make-up” and “interest in finding out about my personal disease risk” were the most important motivators for pursuing sequencing. Less than 13% of participants reported being very concerned about privacy of their genomic information or insurance discrimination. The majority of participants reported discussing their results with a family member (81%) or with a healthcare provider (51%). Less than 13% reported having any follow-up medical tests, exams, or procedures because of their results. One out of every four participants reported that what they learned from their results would help reduce their chances of getting sick.

**Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.**

The PeopleSeq Consortium aims to better understand the medical, behavioral, and economic impacts of returning genome sequencing results to healthy adults with the overall goal of informing policy and clinical practice.

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Semantically rich interfaces for cloud scale genomics

Pollack, S.; Gopaulakrishnan, S.; Carey, V.J.

Since its founding in 2001 by a small group of investigators at DFCI, BWH, JHU and UC Berkeley, the Bioconductor project has grown to involve over 500 developers on 4 continents, who share code over a common infrastructure based on R statistical computing environment to enable efficient analysis of the newest
A key component of Bioconductor infrastructure is the "SummarizedExperiment", that coordinates assay outputs with extensive metadata about samples, features, protocols. While the prevailing model for development and use remains the local desktop or cluster, it is inevitable that cloud-scale storage and computation will be required for the most effective integrative analysis of genomic experiments/observational studies. We describe how local- or cloud-resident objects designed according to Bioconductor practices can mediate between users and "back ends" that are constantly evolving in the direction of autonomous distribution and scaling of data and procedures. We examine the use of a python based web-service, the HDF5 server as a back-end for voluminous data acquired in single-cell RNA sequencing. Our Bioconductor package called restfulSE allows interaction with cloud-scale HDF5 archives through the interface defined by the well-established SummarizedExperiment architecture. This demonstrates the benefits of throughput, reliability from semantically rich and programmatically coordinated presentations of diverse types of data, software, and annotation.

Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background. *

We built a software system that permits scientists to interact with extremely large data without the necessity of downloading it to local hardware. This makes it possible for scientists to perform detailed analyses of genes and genomes using software that is flexible enough to be used on a smartphone. Interpreting these very large data sets is essential to understanding the causes of complex diseases and developing preventions and treatments that secure long-term health.

Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.*

Modern biological experimental techniques produce extremely large raw data. Bioinformaticians analyze these data to discover genetic and epigenetic influences on complex diseases. We develop computer software systems that provide interfaces between the bioinformatician and cloud-based repositories of experimental results.

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If you selected 'other' please specify your research area:

**Title**
Membrane affinity and selectivity of fPD-like αSyn mutants

**Authors**
Julia Pitino, Alex Powers, Matteo Rovere, Tim Bartels

**PI**
Tim Bartels

**Abstract Body (MUST be limited to 200 words, anything beyond 200 words will be truncated for print)**
Parkinson’s disease (PD) and several other neurodegenerative disorders are characterized by the presence of cellular inclusions, called Lewy bodies and...
neurites. Their major constituent is α-synuclein (αSyn), a protein localized in the presynaptic terminals of neurons. While the exact physiological role of αSyn remains uncertain, studies have tied it to the regulation of vesicular trafficking at the synapse. αSyn exists in an unfolded monomeric conformation that is susceptible to Lewy Body formation; however, it folds in a α-helix upon interaction with the curved membranes of synaptic vesicles. Membrane binding is believed to play an important role in signal transmission, but the homeostasis between the free and bound forms could also be one of the determinants of the pathogenicity. Our study aims to characterize the membrane affinity and selectivity of E46K αSyn, a mutation known to cause early-onset PD, and two exaggerated forms of this mutant: E35/46K (2K) and E35/46/61K (3K). Transgenic mice containing the 3K mutation show parkinsonian motor deficits by 6 months, constituting a unique animal model for the study of synucleinopathies. We used synthetic small unilamellar vesicles as a model for synaptic vesicles and studied the binding process using a variety of spectroscopic and calorimetric techniques.

Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background. *

α-synuclein (αSyn) is a protein implicated in the pathogenesis of Parkinson’s disease (PD) and other neurodegenerative syndromes. αSyn aggregates, known as Lewy bodies and neurites, are detected in the brains of patients and are routinely used for the diagnosis of PD. The physiological function of αSyn is unclear, but recent studies have tied it to the transmission of electrical signals in nervous tissue. αSyn is normally unstructured but it can rearrange into a helix upon interaction with lipid membranes. Its membrane-binding ability is believed to be one of the key aspects of its physiological function and relevant in the inception of pathology. Families carrying the E46K mutation in the αSyn gene will develop early-onset Parkinson’s disease. In our project we study how the E46K mutation and two similar, “exacerbated”, mutations affect the membrane affinity of αSyn. These mutants have been shown to cause severe motor deficits and Lewy-body-like aggregates in animal models and are thus believed to be valuable models for PD and similar neurodegenerative conditions. We used synthetic lipids to reconstitute membranes mimicking those found in nervous tissue and employed several biophysical techniques to study the affinity of αSyn and its mutants for different lipid mixtures.

Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.*

The affinity for membranes of αSyn, a protein implicated in neurodegeneration, is at the core of its physiology and pathology. By studying the membrane binding of αSyn’s disease-carrying mutations we can model and investigate the mechanism of disease.

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If you selected 'other' please specify your research area:

Title* Unexpected Increase in Melatonin Concentrations during Daytime Sleep in Simulated Night Shift Protocol; interindividual differences and physiological consequences

Authors* Jingyi Qian  
PI* Frank Scheer

Abstract Body (MUST be limited to 200 words, anything beyond 200 words will be truncated for print)*
In our recent highly-controlled simulated night shift protocol, we observe a significant increase in melatonin levels during daytime sleep. That cannot be explained by the conventional two-process model of melatonin regulation: circadian control and acute light suppression. Moreover, we also observed substantial inter-individual differences in the degree of melatonin elevation during daytime sleep and melatonin suppression during nighttime wakefulness while exposed to moderate light (90 lux). The melatonin increase during daytime sleep and nighttime melatonin suppression during nighttime wakefulness were positively correlated with each other (p<0.001), and both magnitudes becomes larger upon repeated exposure to simulated night shifts (p<0.01 and p<0.001, respectively). Together, these results raise the possibility that inter-individual differences in circadian system characteristics may play a role in individual melatonin responses under night shift conditions. Importantly, the individual differences in melatonin profile were also shown to be associated with their glucose control under night shift conditions, with higher melatonin level during biological night (less nightlight-induced suppression) being correlated with higher postprandial glucose levels (p<0.05). This suggested that individuals whose melatonin diurnal profile is more resistant to nightshift may be more susceptible to the adverse metabolic effects brought by the nightshift conditions.

Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background. *

Night shift work is known to disrupt circadian system and impair glucose tolerance. However, there are large inter-individual differences in circadian and metabolic responses to night shift work that haven’t been fully characterized. By studying the 24-h melatonin profiles during a highly-controlled simulated night shift protocol, we observed substantial inter-individual differences in the degree of changes in melatonin profiles under night shift conditions. The individual differences in melatonin profile were also shown to be associated with their glucose control under night shift conditions, with higher degree of melatonin changes being correlated with lower postprandial glucose levels. As melatonin has been a marker for circadian system, our results suggested that individuals whose circadian system is more resistant to night shift may be more susceptible to the adverse metabolic effects brought by the night shift conditions.

Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.*

Our findings indicated that a robust and resistant circadian clock under night shift conditions may put individuals at higher risk of glucose intolerance. Personalized shift schedule may be helpful to minimize the adverse metabolic effects of night shift work.

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- Women's Health & Gender Biology
- Hospital Medicine

If you selected 'other' please specify your research area:

Hospital Medicine

Title*

Laboratory Analysis and Repletion of Plasma Magnesium at Two Major Academic Medical Centers: Patterns of Use and Attitudes

Authors*

Reiger, Sheridan MD MPH; Lewandrowski, Kent MD; Barkoudah, Ebrahim, MD; Baron, Jason MD

PI*

Kent Lewandrowski, MD
Abstract Body (MUST be limited to 200 words, anything beyond 200 words will be truncated for print)*

Background: Serum magnesium is a commonly checked laboratory assay. Unfortunately, there is little evidence demonstrating benefit from checking and repleting magnesium for the majority of inpatients – including those who are critically ill. Methods: An internet based survey was sent to internal medicine house staff and hospitalist services (including attending physicians and NPs/PAs) at Massachusetts General Hospital and Brigham and Women’s Hospital. Laboratory and magnesium repletion ordering data from 2015-2016 was obtained directly from laboratory and pharmacy databases. Results: 260 care providers responded. 43% of respondents felt that serial assessment and repletion of magnesium was too frequent, and most commonly did so (72.7%) due to the culture of their institution. Only 11.5% of respondents did so because of published evidence. A mean number of 3 (CI 1 to 6) plasma magnesium orders were used on medicine services – with MICU as an outlier (mean 6, CI 3 to 12). There was higher usage on housestaff general medicine teams (mean 4, CI 2 to 7) than for hospitalist teams (2, CI 1-5). Conclusions: Our data reaffirm that despite widespread checking and repletion of plasma magnesium it is not felt to be an evidence driven practice by providers at two major academic centers.

Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background. *

We frequently check magnesium for our patients who are ill and in the hospital. It is an element which is felt to be important for health, but there is very little evidence that checking levels in blood is related to how much is in the entire body, or that treating low blood levels improves illnesses for which people are hospitalized. We surveyed doctors, and nurse practitioners from both Brigham and Women’s and Massachusett’s General Hospitals and found that they mostly checked and treated magnesium levels because of what they were expected to do, but not because they knew of any published studies or science to support it. We also looked at how often Internal Medicine providers at these two hospitals check and replete magnesium, and found that it is done very often and consistently between different kinds of medicine teams (cardiology, oncology, general medicine). We feel that this shows that we need to learn more about the usefulness of magnesium checking and repletion especially since it is so common.

Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.*

We feel that this shows that we need to learn more about the usefulness of magnesium checking and repletion especially since it is so common.

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BWH Title or HMS Rank (if relevant)*  Clinical Pharmacy Specialist

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- Regenerative Medicine
- Trauma
- Women's Health & Gender Biology
- Other

If you selected 'other' please specify your research area:
Anticoagulation

Title*
1. Evaluation of increased incidence of heparin induced thrombocytopenia at a large academic teaching hospital

Authors*  Jessica Rimsans, Megan Barra, Hisham Badreldin, Julie Lauffenburger, Jean Connors,

PI*  Jessica Rimsans
Abstract Body (MUST be limited to 200 words, anything beyond 200 words will be truncated for print)

Background: Between 2015 and 2016, the hemostatic antithrombotic stewardship (HAT) service observed a numeric increase in new HIT cases despite no change in testing methodology, hospital or surgical volume, or management. Methods: A retrospective chart review of patients with suspected HIT treated with a direct thrombin inhibitor (DTI) was performed comparing 2015 to 2016. Patients' baseline characteristics, history and type of heparin product exposure, calculated 4-T score, PF4 and SRA results, and additional risk factors were compared between groups. Results: A total of 118 patients were treated with a DTI for suspected HIT prior to PF4 result. The number of PF4s sent per year was significantly decreased by 37.4%. In 2015, there were 19/54 (35.2%) PF4 positive patients' versus 23/64 (35.9%) in 2016. Of those who were PF4 positive, 6 (31.6%) were SRA positive in 2015 versus 13 (59.1%) in 2016. Conclusion: We were unable to identify any statistically significant differences leading to increased diagnosis of confirmed HIT cases. Trends towards those receiving renal replacement therapy, therapeutic heparin doses, cardiopulmonary bypass, and those with sepsis had higher incidences of HIT.

Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background.

Heparin induced thrombocytopenia (HIT) is a life-threatening side effect of heparin use that can lead to thrombosis or death. Our HAT service observed over a two-year period an increase in those with this suspected side effect, and found no statistically significant difference between groups that may have led to this increase. We found no change in the number of hospital admissions, PF4 and SRA testing methods, or patient characteristics including reasons for heparin treatment and co-morbid disease. While evaluating, the service realized a $1.7 million-dollar cost savings through appropriate management of HIT with a 37% decrease in the number of PF4 tests sent.

Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.

The HAT service monitors the use of anticoagulants and antithrombotic agents, specifically direct thrombin inhibitors, hospital wide. Patients with suspected or confirmed HIT are prospectively evaluated with a calculated 4T-score with real time interventions and assistance in management and education.

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If you selected 'other' please specify your research area:

- Spirituality

Title*

Stem Cell Blessing, Nurses and Chaplains Collaborate to Address the Spiritual Care Needs of the Stem Cell Transplant Patients

Authors*

Rev. Vera O'Brien, BCC Cathleen Rowland RN,MSN,MPH,OCN,BMTCN

PI*

Cathleen Rowland RN,MSN,MPH,OCN,BMTCN
Abstract Body (MUST be limited to 200 words, anything beyond 200 words will be truncated for print)*

In large epidemiologic studies religiously and spirituality have been associated with better survival rates. Hematopoietic stem cell transplant is a high risk life saving treatment for patients with hematological malignancies. Brigham and Women’s/Dana Farber Cancer center does over five hundred transplants per year. Stem cell blessing is a service that is available to all patients receiving a stem cell transplant regardless of their religious faith. The nursing staff ask the patient if they would like their stem cells blessed. Using Partners eCare the nurse enters a consult to the chaplain service requesting a stem cell blessing. The Chaplain customizes the blessing based on the patient’s individual needs and religious beliefs. The nurse communicates the time of the stem cell infusion so the chaplain can make themselves available for the blessing. The nurse, patient, family and chaplain are present for the blessing. The patients are given a copy of the blessing and the chaplain documents in the patients chart. As a quality improvement project to gain a knowledge regarding the offering of the blessing and barriers that result in the blessing not being offered the nursing staff in the hematology/oncology/stem cell transplant units were surveyed.

Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background. *

A stem cell transplant is a treatment for certain cancers such as leukemia, multiple myeloma, and lymphoma. Stem cells are collected from either the patient or a donor. It can be done using stem cells from bone marrow or stem cell collected blood. Back in the 1990’s at the request of a patient to have a prayer said with the administration of their bone marrow infusion the stem cell blessing has evolved. It is a service that in now offered to all patients receiving a stem cell transplant regardless of their religious faith. The chaplain service has adapted the prayer based on the patient’s religious beliefs. The Chaplains support all patients in whatever they are on their spiritual journey and are available to support staff personally and professionally. Nurses offer spiritual support when they listen compassionately and honor the patient’s religious and spirituality. As a quality improvement project to gain a knowledge regarding the offering of the blessing and barriers that result in the blessing not being offered the nursing staff were surveyed.

Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.*

The collaboration of the nursing and chaplain service in acknowledging the patient’s religious and spiritual beliefs with a stem cell blessing supports both religious and spiritual aspects of the patient experience.

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Caring for Our Patient Through Pregnancy, Chemotherapy, Delivery,

Catherine Benedict RN, BSN Megan M. Brennan RN, BSN Cathleen Rowland RN, MSN, MPH, OCN, BMTOC Cathleen Rowland RN, MSN, MPH, OCN, BMTOC

Abstract Body (MUST be limited to 200 words, anything beyond 200 words will be truncated for print)
Cancer during pregnancy is uncommon, one out of every 1,000 pregnancies. The diagnosis of hematological malignancy during pregnancy is rare. Acute leukemia accounts for 1:75,000-1:100000 pregnancies. There is insufficient data on the care of pregnant women with cancer. In this case report we will present information the oncology nursing staff on 7a at Brigham and Women’s Hospital have learned in caring for two pregnant women who were diagnosed with acute leukemia while pregnant, received chemotherapy, delivered healthy babies and went on to have a stem cell transplant post partum. The oncology nurses utilizing our relationship based care model that values the patient/family relationship. It is based on providing patient and family centered care, recognizing and appreciating differences among us. Relationship based nursing care model guided the nursing care and helped to lessen the trauma, fear and challenges while supporting our patients through pregnancy, chemotherapy, delivery and transplant. The nurse know the patient as a person and is able to develop an individualized a plan of care to meet the patient /family needs. By working collaboratively with the multi-disciplinary team, the nurse advocates with and for the patient/ family to achieve optimal outcomes.

**Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background.**

It is a myth that pregnant women with cancer should terminate their pregnancy. More pregnant women with cancer are choosing to continue their treatment while pregnant. A diagnosis of cancer is always traumatic but being diagnosis while pregnant adds substantial fear and challenges to the patient, her family and her care team. Relationship based nursing care model guided the nursing care and helped to lessen the trauma, fear and challenges while supporting our patients through pregnancy, chemotherapy, delivery and transplant. In sharing these case reports it is our hope to emphasize the need for collaborative efforts to expand the basic and clinical research needed to fully understand the challenges in caring for the pregnant oncology patient.

**Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.**

In sharing these case reports it is our hope to emphasize the need for collaborative efforts to expand the basic and clinical research needed to fully understand the challenges in caring for the pregnant oncology patient.

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Title*  
Neurospectroscopic Signatures of CTE-Related Impairments in Retired NFL Players

Authors*  
Marcia Sahaya Louis, Michael Alosco, Benjamin Rowland, Huijun Liao, Joseph Wang, Inga Koerte, Martha Shenton, Robert Stern, Ajay Joshi and Alexander P Lin

PI*  
Alexander P Lin

Abstract Body (MUST be limited to 200 words, anything beyond 200 words will be truncated for print)*
Contact sports athletes, military personnel, and civilians that suffer from multiple head traumas have the potential to develop Chronic Traumatic Encephalopathy (CTE), degenerative brain disease diagnosed only post-mortem by characteristic tau deposition in the brain. There is no definitive in-vivo diagnosis because of heterogeneous clinical symptoms that often overlap with other neurodegenerative diseases. Since head trauma alters brain chemistry, Magnetic Resonance Spectroscopy (MRS) can potentially provide a diagnosis for CTE by noninvasively measuring those chemical alterations. However, these changes can be subtle, and group differences are not sufficient for clinical diagnosis. We propose a machine learning based approach to capture the neuro-spectroscopic signatures corresponding to CTE-related impairments in NFL players. The classification model uses concentration estimates of creatine, choline, N-acetyl-aspartate, glutamate, and macromolecules metabolites to classify between 'Impaired and 'Non-impaired NFL players with 70% prediction accuracy. While these metabolites have been shown to be altered in previous concussion studies, other metabolites may improve the diagnostic accuracy. Two-dimensional correlated spectroscopy (2D COSY), which resolves overlapping metabolites, was acquired to include other metabolites. The 2D COSY model included 18 metabolites, increased prediction accuracy to 89%. MRS with the aid of machine learning will be suitable for a definitive in-vivo diagnosis for CTE.

**Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background.**

Football players and soldiers can experience multiple blows to their head. This injury can change their behavior or memory capacity. Those affected players suffer from a brain disease called Chronic Traumatic Encephalopathy (CTE). Doctors can get a definite diagnosis of the disease only after death. Sadly, there is no clear way to diagnosis CTE while the patient is alive. However, we know that brain injuries affect the chemicals in the brain. Magnetic Resonance Spectroscopy (MRS) is a method of measuring brain chemistry. We obtain MRS data by scanning the patient on an MRI machine. Using machine learning based computer programs, we find the chemicals that change in retired football players. These players have problems with memory capacity, controlling anger, and sadness. To improve the accuracy of the programs we improved our MRS methods and increased it from 70% to 89%. Using these programs to identify CTE will allow us to make a diagnosis while the patient is still alive and monitor their treatment.

**Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.**

The classification model is useful for the identification of brain chemicals measured by magnetic resonance spectroscopy that may serve as biomarkers relevant to the diagnosis of chronic traumatic encephalopathy.

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If you selected 'other' please specify your research area:

Title:

: Genome-wide association study of cancer antigen 125

Authors:


PT:

Peter Kraft, Kathryn L. Terry

Abstract Body (MUST be limited to 200 words, anything beyond 200 words will be truncated for print):

Cancer antigen 125 (CA125) has been shown to be the most promising biomarker for ovarian cancer screening. However, results from two large randomized trials comparing screening using CA125 and transvaginal ultrasound (TVU) to usual care have shown no clinically important difference in ovarian cancer mortality. A major limitation of CA125 as an ovarian cancer screening biomarker has been low specificity. In addition, CA125 levels vary between individuals based on demographic, reproductive and lifestyle characteristics. We hypothesize that, independent of ovarian cancer, genetic variation may influence CA125 levels and identification of genetic predictors of CA125 may be used to improve the predictive value of CA125 as an ovarian cancer screening biomarker. We evaluated the association between common germline genetic variants across the genome in relation to serum levels of CA125 among 347 women without ovarian cancer recruited as population-based controls in the New England Case Control Study. Rs12602627 on chromosome 17 was associated with a 75% increase in CA125 per additional variant allele of rs12602627 (p=6.47x10^-8). The closest gene to this SNP is monocyte to macrophage differentiation associated, which encodes protein expressed in differentiated mature macrophages and is involved in macrophage activation, suggesting it may play an important role in immune response.
Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background.*

Ovarian cancer is highly deadly, and this is because most of the patients are diagnosed at advanced stage. Currently, there is no efficient strategies for ovarian cancer screening. Cancer antigen 125 (CA125) tested in blood was thought to be a promising marker for early detection of ovarian cancer, however studies showed that CA125 was not specific enough for screening. This is in part because CA125 varies widely by individuals. We are trying to improve ovarian cancer detection quality using CA125 by understanding what factors influence the value of CA125. We looked at genetic variants across the whole genome associated with CA125 in 347 women without ovarian cancer, and found that a single genetic variant was associated with 75% change in CA125 and explained about 8% of the CA125 variation.

Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.*

We hope our findings will help improve CA125 as an early detection biomarker for ovarian cancer and contribute to establishing new strategy for ovarian cancer screening.

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- Trauma  
- Women's Health & Gender Biology  
- Other

If you selected 'other' please specify your research area:

Title*  
The Brain Health Champion Program: Promoting Non-Pharmacological Interventions in Cognitive Disorders

Authors*  
Hope E.M. Schwartz, BA, Nicole C. Feng, BA, Seth A. Gale, MD, Kirk R. Daffner, MD

PI*  
Seth A. Gale, MD
Abstract Body (MUST be limited to 200 words, anything beyond 200 words will be truncated for print)*

Given the lack of disease modifying pharmacologic treatments for mild cognitive impairment and early dementia, adoption of brain-healthy behaviors is an important strategy to limit cognitive decline. Despite growing evidence from epidemiologic studies and randomized trials, standard care for cognitively impaired patients does not systematically promote and monitor lifestyle changes to achieve desired outcomes. This study aims to investigate novel ways to foster brain-healthy behaviors in patients treated at the BWH Alzheimer Center. We are piloting a 6-month, randomized, controlled study with a target enrollment of 40 patients with subjective cognitive decline, mild cognitive impairment, and early dementia, receiving longitudinal care at our Center. We hypothesize that the inclusion of face-to-face and virtual visits with an additional clinical team member, emphasizing personalized goal-setting and feedback, will increase adherence to physicians’ brain health recommendations by 25% over a 6-month period, compared to patients who receive standard of care. Using questionnaires validated in cognitively impaired populations, we are measuring the effect of the intervention on physical activity, dietary patterns, and social and cognitive engagement. Secondary analyses are examining measures of cognitive function, neuropsychiatric status, QOL and sleep behavior. Twenty-two participants are currently enrolled, with full enrollment expected by the end of 2017.

Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background. *

Although there is no cure for Alzheimer’s disease, there are a number of changes people with cognitive and memory complaints can make to improve their brain health. Epidemiologic and other studies of individuals at risk for cognitive decline have identified a set of behaviors that can promote brain health. These include exercising regularly, following a Mediterranean-style diet, and engaging in socially and cognitively challenging activities. In this study, we are researching the best way to educate and motivate our patients to improve their brain-healthy behaviors. In the current model of care, doctors may speak with their patients about lifestyle changes, but often do not have the time to closely follow how well their patients are adhering to these recommendations. In our study, we are comparing the standard model of care to a novel clinical program in which patients receive additional support to achieve their brain health goals. In the six-month program, patients have weekly virtual visits by phone or videoconference and in-person visits every six weeks. We hypothesize that compared to standard care, this increased contact with the clinical team will lead to improvements in exercise, diet, and social and cognitive activity by emphasizing personalized goals and providing ongoing feedback.

Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.*

The current standard of care for Alzheimer’s disease does not emphasize non-pharmacologic lifestyle changes. If the Brain Health Champions program is successful, it would offer a new way to promote brain health and reduce the risk of cognitive decline.

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- Immunology/Rheumatology
- Lung Research
- Neurosciences
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- Regenerative Medicine
- Women's Health & Gender Biology

If you selected 'other' please specify your research area:

Title*
Functional Mechanics of a Pectin-Based Pleural Sealant After Lung Injury

Authors*
Andrew B. Servais, Cristian D. Valenzuela, Arne Kienzle, Alexandra B. Ysasi, Willi L. Wagner, Akira Tsuda, Maximilian Ackermann, Steven J Mentzer

PI*
Steven J Mentzer

Abstract Body (MUST be limited to 200 words, anything beyond 200 words will be truncated for print)*
Pleural injury and associated air leaks are a major influence on patient morbidity after lung surgery. Pectin, a plant-derived heteropolysaccharide, has recently demonstrated potential as a bioadhesive. We predicted that a pectin-based biopolymer may be an effective sealant for pleural injury. We studied the interaction of various pectin formulations with the lung mesothelium. A reproducible pulmonary air leak was produced by inserting a 25g needle 1-2mm into the mouse lung. The effectiveness of the pectin bioadhesive in treating the air leaks was assessed by a scripted pressure-decay algorithm using the FlexiVent ventilator system. Needle-induced pleural injury resulted in an air leak and a loss of airway pressure. Application of the pectin-based polymer resulted in restoration of airway pressure with no measurable air leak. Large sheets (50mm2) of the pectin based polymer demonstrated no significant increase in tissue damping or hysteresivity ($\eta$) ($p>0.05$). These data indicate that high-methoxyl pectins, in an equal weight % formulation with carboxymethylcellulose, are a strong mesothelial bioadhesive with potential for clinical application in the treatment of pleural injuries. A pectin-based mesothelial bioadhesive effectively seals pulmonary air leaks with minimal effect on baseline respiratory parameters.

**Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background.**

Air leaks are a common problem after thoracic surgery caused by damage to the pleura, the thin, fragile lining of the lung. Air leaks allow air to escape from the lung into the surrounding chest space causing lung collapse and compromised lung function. Commonly treated with a tube thoracostomy, or “chest tube,” air leaks are a major source of morbidity, increased length of hospital stay, and increased health care costs. The ability to seal air leaks would provide a great benefit to patients. Currently, effectiveness of commercially available products is limited by poor adhesion to the lung tissue. Our lab has developed a biopolymer from naturally occurring substances that have demonstrated strong adhesion to the lining of the lung. By creating a thin film of this bioadhesive we have successfully sealed air leaks in a mouse model. Additionally we analyzed lung mechanics using a rodent ventilator and found that our bioadhesive patch had minimal affect on lung function.

**Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.**

The ability to seal pulmonary air leaks with a naturally-occurring, non-toxic biofilm has the potential to reduce morbidity, length of stay and health care costs associated with thoracic surgery.

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<td>Sarah Rose</td>
<td>Slate</td>
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- Other

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- Adoption and Spread of an Electronic Patient Safety Checklist to Eliminate Adverse Events in Intensive Care Units

**Title**

Adoption and Spread of an Electronic Patient Safety Checklist to Eliminate Adverse Events in Intensive Care Units

**Authors**

Sarah Rose Slate, Anthony Massaro, Patricia Dykes

**PI**

Anthony Massaro

**Abstract Body (MUST be limited to 200 words, anything beyond 200 words will be truncated for print)**

- Adoption and Spread of an Electronic Patient Safety Checklist to Eliminate Adverse Events in Intensive Care Units.
Motivation: Our team developed an electronic ICU Safety Checklist Tool (eISCT) for use in the BWH Medical ICU (MICU) on multidisciplinary rounds. An initial evaluation of the eISCT showed a 30% reduction in adverse events (p=.009). The purpose of this study is to refine the BWH eISCT for use in two additional BWH/Faulkner Hospital ICUs and develop the tools needed by leadership and clinician stakeholders to facilitate generalizability and spread.

Methods: Interdisciplinary rounds were observed to identify barriers to use of the eISCT. We held focus group meetings with stakeholders to determine how to integrate the eISCT into current workflow, identify tools needed for implementation, and receive input on ways to refine the eISCT to improve usability. Results: Based on stakeholder feedback, we developed refined versions of the eISCT. We decided on times in clinician workflow to implement use of the eISCT. We created a toolkit, including pocket guides and a user manual, to help educate clinicians on use of the eISCT. Conclusion/Implications: The eISCT has the potential to enhance team communication and reduce preventable harms in ICUs outside of the BWH MICU. However, communication with stakeholders is essential to the adoption and spread of a safety checklist tool.

Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background.

Checklists have been shown to be helpful in reducing preventable medical harms in intensive care settings. Managing critically ill patients is complex, and checklists can help clinicians organize and manage care and perform patient-safety double checks. We developed an electronic checklist in the BWH Medical ICU that physicians used in the intensive care unit on a daily basis. Over 10 months, we showed that consistent use of the checklist reduced preventable medical harms by 30%. The goal of this project is to show that the checklist we developed for one specific ICU can be used in two other BWH ICUs by refining the checklist and creating tools to teach clinicians how to use the checklist. We observed the daily routine of clinicians in the two ICUs to understand how their practice differed and held focus groups with clinicians to get feedback on the types of tools they wanted to use as guides. From these observations and discussions, we made changes to the checklist to improve generalizability and developed a toolkit that included pocket guides and a manual to facilitate use. A future study will look at whether this toolkit helps clinicians reliably use the checklist and reduce preventable harms.

Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.

Use of an electronic checklist reduced harms in the BWH MICU by facilitating discussion on patient safety. Adoption and spread of this safety checklist to ICUs outside the MICU can reduce harms and improve patient safety on a larger scale.

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If you selected 'other' please specify your research area:

Title*  
Research Assistant

Authors*  
Ximou Song

PI*  
Calum MacRae

Abstract Body (MUST be limited to 200 words, anything beyond 200 words will be truncated for print)*  
We evaluated 304 consecutive patients presenting to a cardiovascular clinic. Patients were tested using a non-invasive bedside tool that integrated a triaxial accelerometer and gyroscope. One of these was placed on the hip and ankle of each patient in order to measure the postural stability of the lower extremities.
The devices provided a systematic method of assessing balance with high precision and reproducibility in both the anterior-posterior and mediolateral directions. We evaluated the use of these sensors in discriminating between individuals with and without atrial fibrillation (AF) in the context of stroke risk and anticoagulation. The goal was to better understand AF pathogenesis and assess the ability of traditional AF therapeutic interventions to rescue the phenotypic characteristics associated with this disease. Balance measurements were positively correlated with stroke risk as calculated using the CHA2DS2-VASc risk stratification scheme. The sensors were also capable of differentiating between AF and non AF groups by showing that the AF patient population had worse balance patterns than the non AF population. Furthermore, the sensors were capable of detecting distinct differences in postural stability between AF subjects that were anticoagulated and AF subjects without anticoagulation.

**Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background.**

Atrial fibrillation (AF) is a cardiovascular rhythm disorder that affects the upper chambers of the heart. This can lead to the formation of blood clots, contributing to significantly increased risk for stroke. Traditionally, strokes have been identified using a number of obvious clinical features, including balance impairment. Smaller clots can cause strokes without obvious symptoms, and have therefore typically been considered silent, but may still have some underlying clinical significance. Our goal was to evaluate the efficacy of a novel, high precision method of measuring standing balance in assessing the effects of stroke risk and atrial fibrillation. We were further interested in determining the impact of drugs, such as anticoagulants, used to manage these conditions. We found that these novel balance assessments can distinguish between AF and non AF populations as well as the presence of anticoagulation. These simple non-invasive measures may help us to quickly understand conditions by introducing new dimensions of digital phenotyping data.

**Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.**

The study utilizes novel balance measures to introduce a unique dimension with which heart disease can be evaluated. Balance assessments may provide an easy and accessible method of detecting early indications of atrial fibrillation and stroke.

*MY SCIENTIFIC AND LAY ABSTRACTS HAVE BEEN REVIEWED BY PARTNERS INNOVATION*
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If you selected 'other' please specify your research area:

Title*
Chemogenetic generation of hydrogen peroxide in the heart: a new model for ROS-dependent heart failure

Authors* Andrea Sorrentino, Benjamin Steinhorn, Vsevolod Belousov, Thomas Michel

PI* Thomas Michel

Abstract Body (MUST be limited to 200 words, anything beyond 200 words will be truncated for print)*
The stable reactive oxygen species (ROS) hydrogen peroxide (H2O2) modulates pathophysiological pathways in cardiac myocytes. By using new chemogenetic approaches to generate and detect H2O2 in cardiac myocytes, we probed the pathophysiological consequences of H2O2 generation in the heart. We exploited a D-amino acid oxidase (DAAO) from yeast that catalyzes the oxidation of D-amino acids to yield the corresponding D-keto acid plus H2O2. We made a novel cardiac-specific DAAO construct using the adeno-associated virus serotype 9 (AAV9). Since most mammalian cells use only L-amino acids, the recombinant DAAO enzyme remains quiescent in infected cardiocytes until D-amino acids are added. We cloned DAAO as a fusion protein with the H2O2 biosensor HyPer so we would be able to generate and detect H2O2. Four weeks after infecting rats with DAAO/HyPer, we isolated cardiomyocytes and measured intracellular H2O2 in real time by HyPer fluorescence imaging. We found that D-alanine but not L-alanine led to robust H2O2 production. We next studied the effects of chemogenetic generation of H2O2 in vivo providing D-alanine in the drinking water of rats infected with DAAO/HyPer virus; echocardiography showed that the hearts of D-alanine-fed rats infected with DAAO/HyPer virus showed marked deterioration in cardiac function compared to control animals.

Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background. *

We have developed a new animal model of heart failure generated by in vivo cardiac-specific production of oxidative stress in rats using a novel “chemogenetic” approach. This new model may lead to the identification of new therapeutic targets to treat heart failure in patients with diabetes and other disease states caused by oxidative stress.

Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.*

Chemogenetic approaches to generate H2O2 in the heart have yielded a novel, robust, and easily-manipulated model for ROS-dependent cardiac dysfunction that may lead to development of new therapeutic targets to treat CHF associated with oxidative stress.

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- [ ] Regenerative Medicine
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- [x] Women's Health & Gender Biology
- [ ] Other

If you selected 'other' please specify your research area:

Title*  
Gαq/11 and Gαs proteins have distinct roles in gonadotropin expression in vivo and in vitro.

Authors*  
George A. Stamatiades1, Han Kyeol Kim1, Rona S. Carroll and Ursula B. Kaiser 1These authors have contributed equally to this work.

PI*  
Ursula Kaiser
Pulsatile release of GnRH activates signal transduction cascades in the pituitary gonadotrope in a frequency-dependent manner to coordinate the synthesis and secretion of FSH and LH and thereby regulate female cyclicity and fertility. FSH, preferentially stimulated at low rather than high GnRH pulse frequencies, is essential for ovarian follicle maturation. We hypothesized that GnRH, acting through its seven-transmembrane receptor, activates distinct G protein-coupled signaling pathways to differentially control FSH and LH synthesis and secretion. We tested this hypothesis through inactivation of Gas and Gq/11 in vivo and in vitro. In mice, gonadotrope-specific deletion of Gas selectively impaired Fshb expression, the key subunit determining FSH levels, whereas Gq/11 deletion impaired both FSH and LH secretion and caused marked hypogonadism and infertility. To determine the mechanisms of these effects, shRNA-mediated knockdown of Gos or Gq/11 was performed in a gonadotrope cell line. Gos-stimulated pathways mediated Fshb expression at low GnRH pulse frequencies, whereas induction of both Fshb and Lhb occurred via Gq/11-stimulated pathways at high GnRH pulse frequencies. These data suggest that Gos-mediated pathways play a greater role in GnRH stimulation of FSH while both gonadotropins depend on Gq/11-mediated signaling, identifying new pathways and potential targets to modulate FSH and hence fertility.

GnRH is a hypothalamic neuropeptide central to the initiation and control of the reproductive hormone cascade and hence fertility. Its action serves as a key regulatory point in the pituitary gland to control of the secretion of the gonadotropins, luteinizing hormone (LH) and follicle-stimulating hormone (FSH), which in turn regulate gonadal function and gametogenesis. GnRH is released in a pulsatile manner, with differential patterns of pulsatile GnRH release leading to differential synthesis and secretion of LH and FSH that are essential for control of female reproductive cyclicity and fertility. We aimed to advance our understanding of the nature of the pituitary GnRH pulse frequency “decoder”, using both cell models and genetically modified mouse models. In mouse models, we identified the Gos protein as a key component in the pathway by which GnRH activates FSH, whereas the Gq/11 protein is more globally important for both LH and FSH. In cell models, we elucidated that molecular pathways by which these differential effects occur. These findings help to elucidate the details of the GnRH pulse frequency “decoder” and identify pathways and targets to modulate FSH separately from LH, with the potential to improve therapy for polycystic ovarian syndrome (PCOS) and other fertility disorders.

The clinical importance of GnRH pulse frequency “decoding” is exemplified in PCOS, a common cause of infertility in women. The ability to modulate FSH separately from LH will improve treatment of PCOS and other causes of infertility.

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Twitter Handle (if applicable)

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- Pregnancy & Fertility
- Regenerative Medicine
- Trauma
- Women's Health & Gender Biology
- Other

If you selected 'other' please specify your research area:

Title*  
Magnetic Resonance Thermography: Using Brain Temperature as a Biomarker

Authors*  
Tyler Starr, Marcia Louis, Alexander Lin PhD

PI*  
Alexander Lin PhD

Abstract Body (MUST be limited to 200 words, anything beyond 200 words will be truncated for print)*
Decreasing brain temperature through medically induced hypothermia can be an effective therapy used after cardiac arrest and ischemic stroke. While the use of hypothermia is well known, using brain temperature as a biomarker in other brain injuries such as schizophrenia and CTE is not. Using Magnetic Resonance Thermography (MRT), we plan on doing exactly that. MRT is based on the concept that there are some molecule’s whose frequencies are temperature dependent while others that have temperature independent frequencies in Magnetic Resonance Spectroscopy (MRS) output. By comparing the frequency difference (ΔPPM) of one temperature independent (e.g. N-acetylasparate) and one temperature dependent peak (e.g. water) from the MRS output, we can determine the temperature. As the metabolite concentration, not its frequency, is often the desired measurement in MRS studies, we created our own MRT processing sequence using open-source MRS software and additional Python packages. Our initial calibration test showed that there is a negative correlation between temperature and ΔPPM (R2 = 0.99137), and with a verified temperature-ΔPPM scale, we will be able to retroactively analyze brain temperature throughout our previous studies. Currently, we have applied this technique on some subjects receiving hypothermia post cardiac arrest (n=10).

Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background. *

Doctors may lower brain temperature after a heart attack or a stroke. In these cases, cooling the brain slows down the harmful effects and allows medicine to prevent brain damage. Recording brain temperature directly is not an easy task. To do it without disturbing the brain, we use Magnetic Resonance Spectroscopy (MRS). MRS uses an MRI machine to produce a graph of chemical values in the brain. Some of these chemicals’ location on the graph will change depending on temperature. Our lab created software to measure the temperature from the MRS data. We used this software in other studies and have discovered that brain temperature changes even without cooling. This project studies brain temperature in different diseases. We hope that our MRS software will soon serve as a useful tool to develop medicine, detect brain swelling, and more.

Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.*

Our goal is to use MRT and brain temperature as an in vivo biomarker for many different brain injuries. Brain temperature could serve as an indicator of inflammation, medication efficacy, and more.

* 

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Last Name* Stubbs

Academic Degrees* BA

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If you selected 'other' please specify your research area:

Title*
Bespoke: a Shiny/MLR Based Machine Learning Web App

Authors*
BJ Stubbs, Benjamin A. Raby, Damien C. Croteau-Chonka, Shweta Gopaulakrishnan, Vincent J. Carey

PT* Vincent Carey

Abstract Body (MUST be limited to 200 words, anything beyond 200 words will be truncated for print)*
Machine learning is a powerful but underutilized tool in clinical data science due to a number of barriers to entry for clinicians. For example, many of the tools and software available require the data to be formatted in a particular way or require a large investment in infrastructure and programming knowledge to get up and running. Some of these barriers are alleviated by metapackages like the MLR R package https://github.com/mlr-org/mlr that provide unified input and output for a variety of machine learning algorithms, but more can be done. Bespoke aims to make MLR easier to use by providing a user-friendly graphical user interface. Bespoke is a Shiny based R script that allows a user to load in data, select the variable for prediction, choose the covariates of interest, set the percentage of data to use for the analysis, pick the algorithm to use, and customize the performance metrics and plots. The software keeps a log of options and results which can be exported in a comma separated format. Bespoke lets data scientists quickly and easily implement MLR to test a number of parameters, algorithms, and covariate sets to find the perfect fit for their machine learning task.

**Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background.**

Machine learning tools can provide powerful insights into clinical trial research, but often times the software to do machine learning can be difficult to set up and hard to use. Bespoke is web based tool that allows researchers to more easily use the machine learning tool set MLR to explore their data in a interactive way that requires no programming experience.

**Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.**

Bespoke is the middle step in a pipeline we are developing to reanalyze locally produced genome wide association studies to enhance discovery and interpretation of genetic variants associated with human diseases.

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If you selected 'other' please specify your research area:
Adolescent Health

**Title**
Quality improvement project using the 2015 WHO Toolkit: Global standards for quality health-care services for adolescents: A standards-driven approach to improve the quality of health-care services for adolescents.

**Authors**
Mary-Christine Sullivan, NP, MPH; Pamela J. Burke, PhD, RN, FSAHM, FAAN; Margaret Jolliffe, WHNP, MPH

**PI**
Mary-Christine Sullivan, NP, MPH;
Abstract Body (MUST be limited to 200 words, anything beyond 200 words will be truncated for print)*

We evaluated the quality of adolescent healthcare at Brookside Community Health Center to identify areas for improvement using the World Health Organization’s 2015 Toolkit. This QI project consisted of an internal needs assessment of the clinic using surveys provided by the toolkit, and site visits and semi-structured interviews with 5 local clinics that provide adolescent healthcare. We focused on four of the eight WHO adolescent healthcare quality standards (3, 4, 5, and 7). For Standard 3: Appropriate Package of Services, our CHC score was 80.37%; healthcare providers were providing the required package of services. For Standard 4: Provider Competencies, our score was 63.77%; we are meeting the standard of care for adolescents to know their rights and receive services in a friendly, supportive, respectful, non-discriminatory and non-judgmental manner. For Standard 5: Facility Characteristics, our CHC score was 82.93%, indicating that our facility meets the standards of convenient operating hours, appointment procedures, and acceptable wait times. For Standard 7: Data Quality and Improvement, our CHC score was 40.85%, showing a need for investment in our data collection and QI projects on adolescent healthcare. Guided by our findings, we will implement changes and demonstrate our progress with follow-up assessments in the future.

Lay Summary (MUST be limited to 200 words, anything beyond 200 words will be truncated for print). Please keep in mind - Discover Brigham is open to the public, this lay summary needs to be appropriate for lay audiences with NO scientific background. *

We evaluated the quality of adolescent healthcare at Brookside Community Health Center to identify areas for improvement using the World Health Organization’s 2015 Toolkit. This QI project consisted of an internal needs assessment of the clinic using surveys provided by the toolkit, and site visits and semi-structured interviews with 5 local clinics that provide adolescent healthcare. We focused on four of the eight WHO adolescent healthcare quality standards (3, 4, 5, and 7). Our results demonstrated that we are meeting the standards of providing the appropriate package of services, provider competencies, and facility characteristics, but need further investment in data and quality improvement efforts for our adolescent population. The delivery of adolescent healthcare is a neglected area of research. There are few standards or tools to measure the quality of adolescent healthcare and insufficient resources dedicated to improving the services and delivery of healthcare to this population. Using the 2015 WHO Toolkit: Global standards for quality health-care services for adolescents: A standards-driven approach to improve the quality of health-care services for adolescents, we were able to conduct a structured needs assessment of our clinic, providing measureable data and feedback on the quality of our adolescent healthcare services.

Clinical Implications (MUST be limited to 40 words and accessible to a lay audience) - please describe the clinical implications of your research.*

Using a standardized toolkit to conduct a needs assessment of our clinic allowed us to measure adolescent healthcare quality and gather baseline data for future quality improvement efforts.

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