

*Embargoed until Monday, Dec. 2, 2013, at 12:01 a.m. ET*

## Scientific Formal (Paper) Presentations

**CODE: SSE21-06**

**SESSION: SSE21**

**Medication Naïve Attention-deficit/Hyperactivity Disorder Subjects Have Low Brain Iron Levels as Detected by Magnetic Field Correlation Imaging**

### Date/Times

- **DATE: Monday**
- **TIME: 3:50-4:00 PM**
- **LOCATION: S102AB**

### PARTICIPANTS

- Vitria Adisetiyo PhD - Nothing to disclose.
- Rachael Deardorff MS - Nothing to disclose.
- Ali Tabesh PhD - Nothing to disclose.
- Els Fieremans PhD - Nothing to disclose.
- Kevin M Gray MD - Nothing to disclose.
- Adriana Di Martino undefined - Nothing to disclose.
- F. Xavier Castellanos MD - Nothing to disclose.
- Jens H Jensen PhD - Nothing to disclose.
- Joseph A Helpem PhD - License agreement, Siemens AG.

### SUBSPECIALTY CONTENT

- Pediatric Radiology

### PURPOSE

Stimulant medication reduces symptoms in attention-deficit/hyperactivity disorder (ADHD) through indirectly increasing dopamine (DA) levels in the striatum. Hence, it is suspected that reduced DA levels are part of ADHD pathology. However, both increased and decreased DA markers have been detected in ADHD. Interestingly, reduced DA markers have been consistently found in medication naïve patients while increased markers have been found in patients with a history of medication use, suggesting increased DA markers may reflect an adaptive response to medication. Here we assess the relationship between medication history and brain iron levels in children and adolescents with ADHD compared to typically developing controls (TDC). As brain iron is required for DA synthesis, assessing iron levels with MRI may provide non-invasive indirect measures of DA.

### METHOD AND MATERIALS

27 TDC, 12 ADHD-naïve and 10 ADHD-medication were recruited. As indices of brain iron, magnetic field correlation (MFC) and relaxation rates ( $R_2$ ,  $R_2^*$  and  $R_2'$ ) were used. All are affected by tissue iron but differ in their sensitivities and specificities. MFC was estimated with MFC imaging,  $R_2$  with a multiple spin echo sequence and  $R_2^*$  with a multiple gradient echo sequence.  $R_2' = R_2^* - R_2$ . The globus pallidus (GP), caudate nucleus (CN), putamen (PUT) and thalamus (THL) were chosen as regions of interest because of their suspected role in ADHD in addition to having high iron content. Serum iron measures were also collected.

### RESULTS

The ADHD-naïve subgroup had significantly lower MFC than either TDC or the ADHD-medication subgroup in 3 of the 4 brain regions studied (FDR corrected). ADHD-naïve vs. TDC: PUT ( $p = 0.005$ ,  $d = 1.0$ ), CN ( $p = 0.003$ ,  $d = 1.1$ ) and THL ( $p = 0.012$ ,  $r = 0.4$ ); ADHD-naïve vs. ADHD-medication: PUT ( $p = 0.002$ ,  $d = 1.5$ ), CN ( $p = 0.004$ ,  $d = 1.4$ ) and THL ( $p = 0.021$ ,  $r = 0.5$ ). TDC and the ADHD-medication subgroup did not significantly differ in MFC. In contrast, no significant group differences were detected using the  $R_2$ ,  $R_2^*$ ,  $R_2'$  or serum measures.

### CONCLUSION

Similar to other DA marker measures, lower brain iron levels (indexed only by MFC) are observed in medication naïve ADHD and appear to normalize with medication.

### CLINICAL RELEVANCE/APPLICATION

Reduced brain iron in medication naïve ADHD is a promising biomarker. MFC imaging's ability to non-invasively detect these aberrant levels may help improve ADHD diagnosis and guide optimal treatment.

*Embargoed until Tuesday, Nov. 26, 2013, at 12:01 a.m. ET*

### Scientific Formal (Paper) Presentations

**CODE: CL-PDS-SU5A**

**SESSION: CL-PDS-SUA**

**Maturation of White Matter and Grey Matter is 'Out-of-Sync' in Premature Born Infants**

#### **Date/Times**

- **DATE: Sunday**
- **TIME: 12:30 -1:00 PM**
- **LOCATION: S101AB**

#### **PARTICIPANTS**

- Stefan Bluml PhD - Nothing to disclose.
- Jessica L Wisnowski PhD - Nothing to disclose.
- Lisa Paquette undefined - Nothing to disclose.
- Marvin D Nelson MD - Nothing to disclose.
- Ashok Panigrahy MD - Nothing to disclose.

#### **SUBSPECIALTY CONTENT**

- Pediatric Radiology

#### **PURPOSE**

To compare metabolism of white matter and grey matter at equivalent post-conceptual (PC) age in term and preterm infants.

#### **METHOD AND MATERIALS**

MR examinations and medical records of 656 patients aged between 270 (term) – 370 post-conceptual (PC) days were reviewed. All subjects had clinically indicated MR examinations. However, 81 subjects had normal MRI (including normal diffusion MRI) and unremarkable clinical follow-up for a minimum of six months. Among these infants, 51 were full-term (gestational age (GA) at birth: 40+/- 1 weeks) and 30 were premature-born (GA: 30+/- 5 weeks). MR spectra acquired with single voxel PRESS (echo time 35ms, repetition time = 1.5s, 128 averages) of parietal white matter (WM) and parieto/occipital grey matter (GM) were analyzed with automated LCModel software and absolute metabolite concentrations were obtained. Metabolite versus age curves for term and preterm cohorts were generated and compared for statistical significant differences.

#### **RESULTS**

Prematurity altered the developmental time courses of N-acetyl-aspartate, a marker for axonal and neuronal development, creatine, an energy metabolite, and choline, a membrane metabolite, in WM. Specifically, we found that the premature metabolic development initially precedes term maturation, but then progresses at a slower pace merging with term brain development at ≈340-370 post-conceptual days. In GM no statistical difference was observed for any metabolite.

#### **CONCLUSION**

The biochemical maturation of white matter of term and preterm infants is significantly different whereas no significant differences were observed for grey matter. This indicates that mainly processes of WM maturation, such as axonal growth and possibly myelination are affected by premature birth. Consequently, the timing and synchronization of white and grey matter maturation is disturbed. There appears to be a "false start" of some maturational processes in WM triggered by physiological and/or stimulatory events after birth. This may contribute not only to the greater risk of long-term neurological problems of premature babies, but also to their higher risk for brain injury.

#### **CLINICAL RELEVANCE/APPLICATION**

Therapeutic interventions that aim to alleviate the possible adverse impact of prematurity on brain function may need to emphasize strategies that prevent a "false start" of white matter maturation.

*Embargoed until Tuesday, Dec. 3, 2013, at 12:01 a.m. ET*

### Scientific Formal (Paper) Presentations

CODE: SSK01-02

SESSION: SSK01

Implementing Digital Breast Tomosynthesis (DBT) in a Screening Population: PPV1 as a Measure of Outcome

#### Date/Times

- **DATE:** Wednesday
- **TIME:** 10:40-10:50 AM
- **LOCATION:** Arie Crown Theater

#### PARTICIPANTS

- Emily F Conant MD - Consultant, Hologic, Inc.
- Fei Wan undefined - Nothing to disclose.
- Mathew Thomas BS - Nothing to disclose.
- Marie Synnestvedt undefined - Nothing to disclose.
- Susan P Weinstein MD - Nothing to disclose.
- Susan G Roth MD - Nothing to disclose.
- Despina Kontos PhD - Nothing to disclose.
- Anne Marie McCarthy undefined - Nothing to disclose.
- Nandita Mitra undefined - Nothing to disclose.

#### SUBSPECIALTY CONTENT

- Breast (Imaging and Interventional)

#### PURPOSE

DBT has been reported to decrease both false positive recalls from screening and to improve cancer detection rates. The purpose of this study is to compare the impact of DBT on PPV1 in a prospective screening population.

#### METHOD AND MATERIALS

In October 2011, we began screening all of our patients with DBT and thus far, have imaged over 17,000 women. For the group and for each of six radiologists, all trained in DBT interpretation, the following metrics were compared for the 16 months of DBT screening and for the year prior of digital mammography (DM) screening: Total volume of cases read, recall volumes and rates, cancer detection rate and PPV1. PPV1 was defined as the proportion of positive screening mammograms (0, 4 or 5) from which cancer was diagnosed.

#### RESULTS

Thus far, outcome data for 15,633 women imaged with DBT have been compared to the prior year of 10,753 patients imaged with DM. The average recall rate for the group of 6 readers decreased from 10.40% to 8.78%. After generalized estimating equation based on adjustment to account for variability in the readers' volumes over time, the recall rate was significantly higher under DM versus DBT with an OR = 1.23, 95% CI: [1.07, 1.40](p=0.002). By reader, DM recall rates ranged from 15.32-5.72%; DBT recall rates ranged from 13.03-4.84%. 5 of the 6 readers decreased their recall rates; 1 reader had no change. Overall, the cancer detection rate increased from 3.51 to 5.24/1000 with DBT (p>0.05). 4 of the 6 readers increased their cancer detection rate; 2 readers had minimal decreases (both had decreases in recall). The one reader with an overall stable recall rate increased her cancer detection rate from 3.4 to 6.3/1000. The DM PPV1 for the readers ranged from 2.5 to 12.1%. With DBT, 5 of the 6 readers increased their PPV1 significantly (new range from 4.7 to 11.7%). 1 reader had no significant change in PPV1 but a slight drop in recall. The overall PPV1 increased for the group was from 4.1% to 6.0% (p=0.044).

#### CONCLUSION

The implementation of DBT in a large screening program demonstrated a reduction in recall rates and an increase in cancer detection rates that varied by reader. The balance of these outcomes for each reader, as measured by PPV1, showed significant improvements for 5 of 6 readers and stability for 1 reader.

#### CLINICAL RELEVANCE/APPLICATION

Screening outcomes as measured by PPV1 improved with DBT implementation in a large, prospective population.

*Embargoed until Tuesday, Dec. 3, 2013, at 12:01 a.m. ET*

### Scientific Formal (Paper) Presentations

CODE: SSK12-03

SESSION: SSK12

**Radiolabeled Antibody to gp41 HIV Glycoprotein Kills ART-treated Lymphocytes from HIV Patients and HIV-infected Monocytes in Human Blood Brain Barrier Model**

#### Date/Times

- **DATE: Wednesday**
- **TIME: 10:50 -11:00 AM**
- **LOCATION: S504CD**

#### PARTICIPANTS

- Ekaterina Dadachova PhD - Nothing to disclose.
- Dina Tsukrov undefined - Nothing to disclose.
- Alicia McFarren undefined - Nothing to disclose.

#### SUBSPECIALTY CONTENT

- Molecular Imaging

#### **PURPOSE**

Eliminating virally infected cells is an essential component of HIV eradication strategy. In addition, many patients on antiretroviral therapy (ART) suffer from HIV-associated neurocognitive disorders as the brain becomes a reservoir for infection. Thus, the drugs that can enter into the CNS and eradicate the infection are needed.

#### **METHOD AND MATERIALS**

Radioimmunotherapy (RIT), a clinically established method to kill cells using radiolabeled monoclonal antibodies (mAbs), was recently used to target the HIV gp41 glycoprotein expressed on the surface of infected cells. As gp41 expression by the infected cells is downregulated in patients on ART, we evaluated the ability of RIT to kill infected cells treated with ART in vitro using patients lymphocytes. We also tested the ability of the same radiolabeled mAb 2556 to gp41 to cross the blood brain barrier (BBB) and kill HIV infected monocytes in the CNS.

#### **RESULTS**

We found that RIT was able to specifically kill ART-treated lymphocytes and to reduce HIV p24 to undetectable levels. ART and RIT worked in concert to decrease viral production when compared to ART or RIT alone, indicating that expression of gp41 under ART was still sufficient to allow 2556 mAb binding and killing infected cells. A 4  $\mu$ Ci dose of 213Bi-2556 successfully killed over 80% of PBMCs ( $p < 0.05$ ), even in patients with well-controlled viremia. The isoelectric point (pI) of 2556 mAb was  $>9$  compared to isotype control 1418 mAb pI of 8. 213Bi-2556 killed significantly more HIV infected than uninfected monocytes on the astrocyte side of the BBB in dose response manner ( $p < 0.05$ ). Confocal microscopy staining for tight junction proteins did not demonstrate any significant damage to the barrier integrity.

#### **CONCLUSION**

In conclusion, RIT in concert with ART eliminated infected cells. Co-treatment was effective in both Atripla and tenofovir/emtricitabine/atazanavir cohorts. We demonstrated the unique ability of 213Bi-2556 mAb to cross the BBB and specifically kill HIV infected monocytes. These findings demonstrate the feasibility of an RIT-based strategy for use with ART to achieve HIV eradication systemically and in CNS.

#### **CLINICAL RELEVANCE/APPLICATION**

HIV/AIDS remains an incurable disease. Our goal is to develop RIT-based strategies for therapy of systemic and CNS HIV for use with other anti-retroviral strategies to achieve complete HIV eradication.

*Embargoed until Monday, Dec. 2, 2013, at 12:01 a.m. ET*

## Scientific Formal (Paper) Presentations

CODE: SSC02-06

SESSION: SSC02

**Caffeine and Taurine Containing Energy Drink Improves Systolic Left-ventricular Contractility in Healthy Volunteers Assessed by Strain Analysis Using Cardiac Magnetic Resonance Tagging (CSPAMM)**

### Date/Times

- **DATE: Monday**
- **TIME: 11:20 -11:30 AM**
- **LOCATION: S502AB**

### PARTICIPANTS

- Jonas Doerner undefined - Nothing to disclose.
- Daniel Kuetting undefined - Nothing to disclose.
- Claas P Naehle MD - Consultant, Medtronic, Inc.
- Hans H Schild MD - Nothing to disclose.
- Daniel K Thomas MD - Nothing to disclose.

### SUBSPECIALTY CONTENT

- Cardiac Radiology

### PURPOSE

Energy drinks (ED) usually contain a high amount of caffeine, taurine, and sugar as their main ingredients. Although their consumption appears not uncritical, there is little or no regulation on ED sales so far. Concerns about adverse side effects especially focus on heart function in adolescents and young adults. In this study, we investigated the effect of ED consumption on myocardial function in healthy volunteers using MRI tagging and strain analysis.

### METHOD AND MATERIALS

18 healthy volunteers (15 male, 3 female, mean age: 27.5 years) were investigated using cardiac magnetic resonance imaging (CMR). CMR was performed on a 1.5-Tesla whole body scanner directly before and 1h after consumption of a taurine (400 mg/ 100 ml) and caffeine (32 mg/100 ml) containing ED (168 ml/m<sup>2</sup> body surface area). For left-ventricular (LV) myocardial tagging, complementary spatial modulation of magnetization (CSPAMM) was used. Strain was calculated for peak strain (PS), peak systolic strain rate (PSSR) and peak diastolic strain rate (PDSR) using TagTrack (Gyrotools, Zurich, Switzerland). Steady state free precession (SSFP) cine imaging was used for determination of LV-function. Additionally vital parameters such as heart rate (HR) and blood pressure (BP) were recorded throughout the investigation.

### RESULTS

PS and PSSR as parameters for systolic LV-contractility were significantly increased 1h after ED consumption compared to baseline (PS: w/o ED  $-22.33 \pm 1.7$ ; w ED  $-24.15 \pm 2.4$ ;  $p=0.01$ ; PSSR: w/o ED  $-1.18$  1/s  $\pm 0.08$ ; w ED  $-1.30$  1/s  $\pm 0.16$ ,  $p=0.01$ ). PDSR as a parameter for diastolic LV-relaxation was slightly, but not significantly higher compared to baseline (PDSR: w/o ED  $1.90$  1/s  $\pm 0.33$ ; w ED  $2.09$  1/s  $\pm 0.44$ ,  $p=ns$ ). No significant changes were found for LV-function (LV-EDV: w/o ED  $141$  ml  $\pm 31$ ; w ED  $145$  ml  $\pm 33$ ; LV-EF: w/o ED  $64$  %  $\pm 4$ ; w ED  $66$  %  $\pm 8$ ) and vital parameters (HR: w/o ED  $63$  1/min  $\pm 9$ ; w ED  $62$  1/min  $\pm 7$ ; BP: w/o ED  $113/62$  mmHg; w ED  $117/64$  mmHg).

### CONCLUSION

This work reveals that ED consumption has a short-term impact on cardiac contractility, therefore further studies have to evaluate the impact of long-term ED consumption and the effect of ED on patients with heart disease to determine potential risks or benefits of ED consumption.

### CLINICAL RELEVANCE/APPLICATION

ED consumption lead to changes in LV-contractility, which can be assessed by CMR tagging and strain analysis.

*Embargoed until Monday, Dec. 2, 2013, at 12:01 a.m. ET*

### Scientific Formal (Paper) Presentations

**CODE: VSMK31-09**

**SESSION: VSMK31**

**The Effects of US-guided Injection of Platelet-rich-Plasma (PRP) on the Degenerative Disease of the Achilles and Patellar Tendon in Athletes**

#### Date/Times

- **DATE: Tuesday**
- **TIME: 10:30 -10:40 AM**
- **LOCATION: E451B**

#### PARTICIPANTS

- Alice La Marra MD - Nothing to disclose.
- Lorenzo Maria Gregori undefined - Nothing to disclose.
- Silvia Mariani MD - Nothing to disclose.
- Luigi Zugaro undefined - Nothing to disclose.
- Antonio Barile undefined - Nothing to disclose.
- Carlo Masciocchi undefined - Nothing to disclose.

#### SUBSPECIALTY CONTENT

- Musculoskeletal Radiology

#### **PURPOSE**

To evaluate and show the result of injection with Platelet Rich Plasma (PRP) of tendinosis of Achilles and Patellar tendon in athletes.

#### **METHOD AND MATERIALS**

In the last three years we evaluated 50 athletes with degenerative tendinosis of Achilles tendon and 30 athletes with degenerative tendinosis of patellar tendon. All the patients were first evaluated through diagnostic testing (MRI and US guided) and then through clinical observations (VAS for pain and VISA-A and VISA-P for functionality). The patients underwent a cycle of platelet rich plasma US-guided infiltrations every 21 days for a total of three treatments. Another MRI was performed 30 days and one year after the last infiltration.

#### **RESULTS**

In the patients with tendinosis of Achilles tendon we have found an improved overall by 80% (VAS) and 53% (VISA-A). Relatively to the patellar tendon, the VAS value is increased of 75% (VAS) and 50% (VISA P). We observed partial or complete morphological recovery and normalization of MRI signal in 90%. We observed a reduction of sectional area in the Achilles tendon in 39/50 cases and in the patellar tendon in 18/30 cases. Eight patients with tendinosis of Achilles tendon presented an area increased by 10% and five patients with tendinosis of patellar tendon presented an area increased by 15%. The mean VAS at one year of treatment improved in all cases overall by 70%.

#### **CONCLUSION**

Our study showed that in patients who underwent PRP treatments there was an improvement of the functionality, a decrease in pain and a normalization of the signal intensity seen on MRI. Therefore, our experience proves that PRP infiltration may be a good therapeutic alternative for the treatment of Achilles and patellar tendinopathy in athletes.

#### **CLINICAL RELEVANCE/APPLICATION**

The US-guided PRP treatment in case of degenerative tendon diseases may increase Achilles and Patellar tendons functionality and reduce recovery times in athletes.

*Embargoed until Tuesday, Dec. 3, 2013, at 12:01 a.m. ET*

## Scientific Formal (Paper) Presentations

**CODE: S5J05-05**

**SESSION: S5J05**

**Cardiovascular Risk Associated with Non-obstructive Coronary Artery Disease on CCTA Stratified by Sex Among Stable Individuals: Results from an International Multicenter Study of 18,158 Patients**

### Date/Times

- **DATE: Tuesday**
- **TIME: 3:40 -3:50 PM**
- **LOCATION: S504AB**

### PARTICIPANTS

- Jonathan A Leipsic MD - Speakers Bureau, General Electric Company Speakers Bureau, Edwards Lifesciences Corporation Medical Advisory Board, General Electric Company Medical Advisory Board, Edwards Lifesciences Corporation Research Grant, Heartflow, Inc.
- Gilat Grunau PhD - Nothing to disclose.
- Carolyn Taylor MD - Nothing to disclose.
- Cameron J Hague MD - Nothing to disclose.
- Leslee Shaw PhD - Grant, Bracco Group Grant, Astellas Group.
- James Min MD - Medical Advisory Board, General Electric Company Research support, General Electric Company Speakers Bureau, General Electric Company Medical Advisory Board, Arineta Ltd Research support, Koninklijke Philips Electronics NV Research support, Toshiba Corporation Medical Advisory Board, AstraZeneca PLC Medical Advisory Board, Bristol-Myers Squibb Company Consultant, HeartFlow, Inc Stockholder, TC3 Health, Inc Stockholder, MDDX Medical Solutions.
- Gudrun Feuchtnner MD - Advisory Board, Covidien AG Research Consultant, Medtronic, Inc.
- Ricardo C Cury MD - Research Grant, Astellas Group Research Consultant, Astellas Group Research Grant, General Electric Company.
- Matthew J Budoff MD - Grant, General Electric Company.
- Stephan Achenbach MD - Speakers Bureau, Siemens AG Consultant, SERVIER Research Grant, Siemens AG Research Grant, Bayer AG.

### SUBSPECIALTY CONTENT

- Cardiac Radiology

#### **PURPOSE**

Coronary artery disease (CAD) detected by coronary computed tomographic angiography (CCTA) has been shown to predict death and major adverse cardiac events (MACE) in men and women. To date, potential difference in gender-based prognostic utility of non-obstructive CAD identified on CCTA for myocardial infarction and death has not been adequately examined.

#### **METHOD AND MATERIALS**

From an international multicenter observational cohort study of 27,725 individuals consecutively undergoing CCTA from 12 centers, we identified 18,158 patients without known CAD with normal CCTA or non-obstructive disease (defined as <50% diameter stenosis). Non-obstructive CAD presence and extent (segment involvement score) was related to incident MACE—inclusive of death, and myocardial infarction — using multivariable Cox proportional hazards models in addition propensity matching for cardiac risk factors and SIS was performed.

#### **RESULTS**

At a 2.3 + 1.1-year follow-up, MACE occurred in 251 patients (0.6% annual event rate). Women were more likely to be dyslipidemic, hypertensive, diabetic and have a family history of CAD ( $p < 0.001$  for all), while men were more likely to have higher Framingham risk score ( $p < 0.001$ ) In multivariable analysis, non-obstructive CAD was associated with a hazard ratio [HR] of 1.83 (95% confidence interval: 1.1-3.0,  $p = 0.02$ ) in men and an HR of 1.84 (1.1-3.0,  $p = 0.02$ ) in women for MACE. After propensity matching for risk factors and segment involvement score, non-obstructive disease conferred the same risk for men and women for both MI ( $p = 0.89$ ) and death/MI ( $p = 0.90$ ). Kaplan-Meier MACE-free survival estimates for risk factors, symptoms, and number of coronary segments with non-obstructive CAD were similar between men and women ( $p = 0.94$ ). The absence of CAD was associated with similar lowannualized rate of events (Men 0.3% and women 0.4%, respectively;  $p = 0.20$ ). When propensity matched non-obstructive disease is also associated with a similar event rate between men and women (Men 0.8% vs Women 0.9%  $p = 0.89$ ).

#### **CONCLUSION**

Non-obstructive CAD on CCTA confers similar risk of death and myocardial infarction in men and women when matched for underlying cardiovascular risk. The absence of plaque is associated with a similarly low event rate in men and women.

#### **CLINICAL RELEVANCE/APPLICATION**

Our data confirms similar risk of non-obstructive CAD on CCTA between men and women helping to better understand CAD related sex differences.

*Embargoed until Monday, Dec. 2, 2013, at 12:01 a.m. ET*

### Scientific Formal (Paper) Presentations

**CODE:** SSC12-05

**SESSION:** SSC12

**Diffusion Tensor Imaging and Neuropsychological Performance in Post-acute Blast-induced Traumatic Brain Injury among U.S. Military Veterans**

#### **Date/Times**

- **DATE:** Monday
- **TIME:** 11:10 -11:20 AM
- **LOCATION:** N229

#### **PARTICIPANTS**

- Thomas M Malone BA - Nothing to disclose.
- Jacob Bolzenius BA - Nothing to disclose.
- Mark Colijn MS - Nothing to disclose.
- Evan Schulze BA - Nothing to disclose.
- P. T Roskos PhD - Nothing to disclose.
- Richard R Bucholz undefined - Nothing to disclose.
- Jeffrey D Stout undefined - Nothing to disclose.

#### **SUBSPECIALTY CONTENT**

- Neuroradiology

#### **PURPOSE**

Operations Iraqi Freedom and Enduring Freedom have resulted in a returning veterans with an approximately 20% exposure rate to blast-induced mild traumatic brain injury (mTBI)[1]. Standard neuroimaging (MRI/CT) lacks sensitivity to mTBI; however, some research has shown evidence that Diffusion Tensor Imaging (DTI) can identify white matter injury [2, 3]. DTI measures the local diffusion profile of tissue and can characterize the microstructural integrity of white matter. In this study, we compared DTI derived fractional anisotropy (FA) values in veterans with post-acute blast mTBI versus healthy controls (HCs) and examined the association between FA and neuropsychological measures.

#### **METHOD AND MATERIALS**

Data were acquired using a 3T Philips Achieva scanner. Participants included: 10 veterans with blast mTBI (average of 51.30 months post-injury) and 10 HCs. DTI data were pre-processed using FSL 5.0 and regions of interest (ROIs) were hand-traced using FSLview. The ROIs consisted of the genu and splenium of the corpus callosum and the anterior and posterior limbs of the internal capsule, bilaterally. Average FA values from each ROI were calculated for statistical analysis.

#### **RESULTS**

Comparison of FA values using independent sample t-tests showed significant differences between groups in the posterior limb of the internal capsule, bilaterally ( $p < .05$ ). There were also significant correlations between internal capsule FA values and attention, delayed memory, and psychomotor test scores. Higher mean internal capsule FA values and lower delayed memory and psychomotor test scores were found for the mTBI subjects compared to HCs.

#### **CONCLUSION**

Results indicate that DTI is sensitive to group differences in blast-related mTBI, even in the post-acute phase. This suggests presence of a long-term impact of blast injury on the brain. Paradoxically, higher FA values and lower neuropsychological scores were found among veterans with mTBI.

#### **CLINICAL RELEVANCE/APPLICATION**

DTI shows promise in enhanced sensitivity for detecting mTBI compared to MRI/CT. Identification of changes in specific brain regions may help in diagnosis and treatment of mTBI among veterans.

*Embargoed until Wednesday, Dec. 4, 2013, at 12:01 a.m. ET*

### Scientific Formal (Paper) Presentations

**CODE: SSK02-08**

**SESSION: SSK02**

**Clinical Experience in Noninvasive Treatment of Focal Breast Cancer with Magnetic Resonance Guided High Intensity Focused Ultrasound (MRgFUS)**

#### **Date/Times**

- **DATE: Wednesday**
- **TIME: 11:40 -11:50 AM**
- **LOCATION: E450A**

#### **PARTICIPANTS**

- Luisa Di Mare MD - Nothing to disclose.
- Alessandro Napoli MD - Nothing to disclose.
- Federica Pediconi MD - Nothing to disclose.
- Michele Anzidei MD - Nothing to disclose.
- Vincenzo Noce MD - Nothing to disclose.
- Carlo Catalano MD - Nothing to disclose.

#### **SUBSPECIALTY CONTENT**

- Breast (Imaging and Interventional)

#### **PURPOSE**

To assess safety and feasibility of non-invasive high intensity 3T MR guided focused Ultrasound (MRgFUS) ablation of biopsy-proven invasive ductal breast cancer (IDC) (stage T1 M0 N0) before surgical resection and sentinel lymph node biopsy.

#### **METHOD AND MATERIALS**

Our retrospective study included 12 patients with unifocal biopsy-proven IDC, scheduled and consented to lumpectomy and sentinel lymph node biopsy. We use 3T MRI exam (Discovery 750, GE; Gd-BOPTA, Bracco) to confirm presence and treatable location of enhancing lesion (less than 2 cm). Patient underwent day-surgery single session MRgFUS treatment using ExAblate 2100 system (InSightec), under IRB approval. Post-surgery pathology evaluation test the efficacy of the treatment.

#### **RESULTS**

No significant complications were observed in all subjects during or immediately after the procedure. In 10 patients, multiparametric MRI no shows enhancement at breast treatment area. Post-surgery histological evaluation confirmed the absence of residual neoplastic foci in necrotic tissue area with at least 5 mm margins of normal breast tissue in all 10 patients. In 2 cases treatment failed due to transducer malfunction, and pathologist observed 15% of residual tumor. Results demonstrate excellent agreement between pathology and post-treatment MRI.

#### **CONCLUSION**

MRgFUS is a promise treatment to determines focal and noninvasive excision of unifocal breast cancer, according to histopathology findings.

#### **CLINICAL RELEVANCE/APPLICATION**

MRgFUS is an innovative incisionless technique to obtained reliable ablation of invasive breast cancer and successful clinical outcome.

*Embargoed until Tuesday, Nov. 26, 2013, at 12:01 a.m. ET*

### Scientific Formal (Paper) Presentations

**CODE: SSA23-01**

**SESSION: SSA23**

**A Catheter to Curb your Appetite? A Novel Observation of Weight Loss Following Left Gastric Artery Embolization in Humans**

#### Date/Times

- **DATE: Sunday**
- **TIME: 10:45-10:55 AM**
- **LOCATION: E350**

#### PARTICIPANTS

- Rahmi Oklu MD, PhD - Nothing to disclose.
- Andrew J Gunn MD - Nothing to disclose.
- Elizabeth J Hamilton undefined - Nothing to disclose.

#### SUBSPECIALTY CONTENT

- Vascular

#### **PURPOSE**

Suppressing serum levels of ghrelin, a neuropeptide with powerful appetite-stimulating effects produced in the gastric fundus, is an intriguing potential means of controlling body weight. Since left gastric artery, which preferentially supplies the gastric fundus, is sometimes embolized in interventional radiology procedures, we assessed post-procedural weight loss in patients after left gastric artery embolization.

#### **METHOD AND MATERIALS**

Retrospective analysis of electronic medical records of patients who underwent left gastric artery embolization for upper gastrointestinal (GI) bleeding were compared to age-matched controls of similar patients that had undergone embolization of an artery other than left gastric artery for upper GI bleeding. Patients were included in the analysis if they had a recorded weight within two weeks prior to the embolization and within three months after the procedure. Differences in post-procedural weight loss between the groups were evaluated by a student's t test.

#### **RESULTS**

Fifteen patients (mean age: 66.1 years) were included in the experimental group analysis while eighteen patients (mean age: 63.5 years) were included in the control group analysis. The mean pre- and post-procedural weights in the experimental group were 189.1 lbs and 174.5 lbs, respectively, representing a 7.9% decrease in body weight. The mean pre- and post-procedural weights in the control group were 164.7 lbs and 162.8 lbs, respectively, representing a 1.2% decrease in body weight. The post-procedural weight loss of the experimental group was significantly greater than that observed in the control group ( $P=0.001$ ).

#### **CONCLUSION**

Patients lose significantly more weight after left gastric artery embolization than following embolization of other arteries for upper GI bleeding. The current data suggests that body weight can be potentially modulated via left gastric artery embolization in humans.

#### **CLINICAL RELEVANCE/APPLICATION**

Left gastric artery embolization results in weight loss in humans, which is a novel observation. These findings may lead to a role for the interventional radiologist in the treatment of obesity.

*Embargoed until Tuesday, Dec. 3, 2013, at 12:01 a.m. ET*

### Scientific Formal (Paper) Presentations

CODE: SSJ01-03

SESSION: SSJ01

**Younger Women with Breast Cancer Show Highest Risk from Increased Density Together with Abnormal Density Regression with Age**

#### Date/Times

- **DATE: Tuesday**
- **TIME: 3:20 -3:30 PM**
- **LOCATION: Arie Crown Theater**

#### PARTICIPANTS

- Nicholas M Perry MD - Nothing to disclose.
- Stephen W Duffy undefined - Nothing to disclose.
- Sue E Milner BSC - Nothing to disclose.
- Kefah Mokbel MD - Nothing to disclose.
- Katja Pinker-Domenig MD - Nothing to disclose.

#### SUBSPECIALTY CONTENT

- Breast (Imaging and Interventional)

#### PURPOSE

To assess whether the link between quantitatively measured breast density and associated cancer risk differs between younger and older women, and if so, could this relate to differing patterns of density regression with age in breast cancer patients compared to healthy controls.

#### METHOD AND MATERIALS

282 histopathologically verified breast cancer cases (age range 30-83) and 317 healthy controls matched by date of birth, age at examination and laterality of mammogram used for density determination were included in this IRB approved retrospective study. All breast cancer cases and healthy controls underwent FFDM with breast density measured separately on MLO and CC images using an automated volumetric breast density measurement system (Hologic, Quantra). For each cancer case, the contralateral mammogram was used. Breast density as percentage (%) of fibroglandular tissue was analysed by Quantra. After log transformation we performed polynomial regression to assess the age effect on breast density risk in cases and controls.

#### RESULTS

Breast cancer patients showed higher mammographic density than controls up to the age of 50. Healthy controls demonstrated a significant decline in log % density with age following a linear pattern resulting in the equation:  $[\log(\text{density}) = 3.6926 - 0.0126 \times \text{age}]$ . In breast cancer patients there was a significant departure from linearity, and a term in the square of age was required, as follows:  $[\log(\text{density}) = 5.6531 - 0.0822 \times \text{age} + 0.0006 \times \text{age}^2]$ . Both the coefficient for age and that for the square of age were highly significant ( $p < 0.001$  and  $p = 0.001$  respectively).

#### CONCLUSION

The data suggest that automated volumetric breast density measurement is predictive of breast cancer risk in younger women from the age of 30 and that the risk of breast cancer may be related to an altered pattern of density regression with age.

#### CLINICAL RELEVANCE/APPLICATION

Younger women are at highest risk of density-associated breast cancer and early estimation of density may be useful in offering enhanced screening to some.

*Embargoed until Wednesday, Dec. 4, 2013, at 12:01 a.m. ET*

## Scientific Formal (Paper) Presentations

**CODE: SST09-01**

**SESSION: SST09**

**Vascular Communications between Donor and Recipient Tissues One Year after Successful Full Face Transplantation**

### Date/Times

- **DATE: Friday**
- **TIME: 10:30-10:40 AM**
- **LOCATION: N226**

### PARTICIPANTS

- Kanako K Kumamaru MD, PhD - Nothing to disclose.
- Geoffroy C Sisk undefined - Nothing to disclose.
- Michael L Steigner MD - Speaker, Toshiba Corporation.
- Elizabeth George MBBS - Nothing to disclose.
- Bohdan Pomahac MD - Nothing to disclose.
- Frank J Rybicki MD, PhD - Research Grant, Toshiba Corporation Research Grant, Bracco Group.
- Kurt Schultz RT - Employee, Toshiba Corporation.
- Dimitris Mitsouras PhD - Nothing to disclose.
- David S Enterline MD - Consultant, Bracco Group Speakers Bureau, Bracco Group Consultant, General Electric Company Research support, Siemens AG Research support, Koninklijke Philips Electronics NV.
- Ericka M Bueno PhD - Nothing to disclose.

### SUBSPECIALTY CONTENT

- Neuroradiology

#### **PURPOSE**

To noninvasively study vascular changes that have implications on graft survival and rejection, future surgical planning, and our understanding of the underlying biology changes after full face transplantation.

#### **METHOD AND MATERIALS**

Three full face transplant patients (single anastomosis bilaterally of artery and vein) for whom clinical findings were previously reported (NEJM 2012; 366:715-22) were, for the first time, evaluated for vascular reorganization 1 year after successful transplantation using a previously described 320 x 0.5 mm detector row dynamic CT angiography protocol (AJNR 2012, Aug 9, PMID 22878008).

#### **RESULTS**

Consistent, extensive vascular re-organization was observed among the recipients. Diverted external carotid artery (ECA) or facial artery angiosomes were found to be perfused from newly opened, elaborate collateral circulation. Using the metric of arterial blood flow (BF) at the temporal region expressed as the percentage of the BF at the internal carotid artery, allograft tissue was slightly less perfused when the facial artery was the only donor artery when compared to an ECA-ECA anastomosis (4.4±0.4% vs 5.7±0.7%). However, allograft BF was higher than the recipient normal neck soft tissue. Blood flow to the recipient's tongue was maintained, despite the fact that the recipient lingual arteries were not always preserved. On the side where the lingual artery was ligated, blood flow was redistributed from a contralateral artery. Venous drainage was adequate for all patients, including patients for whom the recipient internal jugular vein was anastomosed in end-to-end fashion on one side.

#### **CONCLUSION**

Despite extensive surface contact between the donor and the recipient, disruption of recipient's blood supply depends on extensive collateralization rather than new vessel ingrowth from the donor tissues. These findings guide both surgical planning and the assessment of potential complications for larger scale face transplant studies.

#### **CLINICAL RELEVANCE/APPLICATION**

A single anastomosis bilaterally of artery and vein is adequate for full face transplantation, evidenced by substantial arterial flow demonstrated on dynamic CT angiography.

*Embargoed until Wednesday, Dec. 4, 2013, at 12:01 a.m. ET*

## Scientific Formal (Paper) Presentations

**CODE: SST01-01**

**SESSION: SST01**

**Mammography Outcomes by Screening Interval: Does Biennial Screening Affect Prognosis?**

### Date/Times

- **DATE: Friday**
- **TIME: 10:30-10:40 AM**
- **LOCATION: E450B**

### PARTICIPANTS

- Lilian Wang MD - Nothing to disclose.
- Laura Billadello MD - Nothing to disclose.
- Riti Mahadevia undefined - Nothing to disclose.
- Paula M Grabler MD - Nothing to disclose.
- Ellen B Mendelson MD - Scientific Advisory Board, Hologic, Inc Research support, Siemens AG Speakers Bureau, Siemens AG Medical Advisory Board, Quantason, LLC Consultant, Quantason, LLC Speakers Bureau, SuperSonic Imagine Research support, SuperSonic Imagine Medical Advisory Board, Toshiba Corporation.

### SUBSPECIALTY CONTENT

- Breast (Imaging and Interventional)

### PURPOSE

In 2009, the U.S. Preventative Services Task Force announced the recommendation for biennial screening mammography for women aged 50-74 years, despite evidence of mortality reduction with annual screening mammography beginning at age 40, as supported by the American College of Radiology (ACR), Society of Breast Imaging (SBI), and American Cancer Society (ACS). The purpose of this study is to use secondary endpoints of tumor size and lymph node positivity to compare the efficacy of screening mammography performed at various time intervals.

### METHOD AND MATERIALS

Under IRB approval, a retrospective review of all screen-detected breast cancers between 2007-2010 was performed. Patients were divided into groups 1-3 based on time interval between screening mammograms, defined as <1.5 years, 1.5-3 years, and >3 years. The three groups were controlled in terms of age, breast density, high risk status, and family history of breast cancer. Audit data as outlined by ACR BI-RADS, including % stage 0 or 1 cancers, % minimal cancer, and % positive axillary lymph nodes, were compared for the three groups. The size of invasive cancers was also compared.

### RESULTS

There were 419 screen-detected cancers during the study period. 34 patients were excluded due to unknown screening interval or lack of surgical pathology and 24 patients were excluded for cancer detection on baseline mammography. To adjust for differences in age between groups, patients >75 years were excluded. This resulted in 332 patients, 207 in group 1, 73 in group 2, and 52 in group 3. There was no significant difference in age, breast density, high risk status, family history, or index histology between groups. The % stage 0 or 1 cancer and % minimal cancer did not differ between the groups ( $p=0.057$  and  $p = 0.498$ , respectively). The size of invasive cancers was also not statistically different between the three groups (ANOVA,  $p=0.165$ ). However, lymph node positivity was lowest in group 1, which was a statistically significant difference (8.7% vs. 20.5% and 15.4%,  $p = 0.002$ ).

### CONCLUSION

Screening mammography performed at an interval <1.5 years significantly reduces the rate of lymph node positivity, thereby improving patient prognosis. This supports recommendations set forth by the ACS, ACR, and SBI.

### CLINICAL RELEVANCE/APPLICATION

Screening mammography performed at an interval less than that recommended by the USPSTF significantly reduces the rate of lymph node positivity, thereby improving patient prognosis.

*Embargoed until Monday, Dec. 2, 2013, at 12:01 a.m. ET*

### Scientific Formal (Paper) Presentations

CODE: SSE17-06

SESSION: SSE17

**Stroke Rehabilitation Using Brain-computer-Interface Technology with Multi-modal Neurological Feedback: Brain Activation Changes Associated with this Interventional Therapy**

#### Date/Times

- **DATE: Monday**
- **TIME: 3:50 -4:00 PM**
- **LOCATION: N228**

#### PARTICIPANTS

- Brittany Young undefined - Nothing to disclose.
- Jie Song MS - Nothing to disclose.
- Leo Walton undefined - Nothing to disclose.
- Svyatoslav Vergun undefined - Nothing to disclose.
- Veena A Nair PhD - Nothing to disclose.
- Mitch Tyler undefined - Nothing to disclose.
- Justin Sattin undefined - Nothing to disclose.
- Dorothy Farrar-Edwards undefined - Nothing to disclose.
- Justin Williams undefined - Nothing to disclose.
- Vivek Prabhakaran MD, PhD - Nothing to disclose.

#### SUBSPECIALTY CONTENT

- Neuroradiology

#### **PURPOSE**

Brain-computer interface (BCI) is an emerging technology for stroke rehabilitation, but little is known about neuroplastic changes associated with its use. We examine changes in brain activity during imagined (MI) and executed (ME) hand motor tasks associated with BCI-based interventional therapy.

#### **METHOD AND MATERIALS**

Anatomical and functional images were collected on 16 subjects (8 stroke patients; 8 healthy controls) on a GE 3T MR scanner. Functional images were acquired during MI and ME finger tapping or squeezing of each hand. Not all subjects completed all tasks. Patients had right upper extremity impairment and were given therapy of the affected hand up to three times weekly for up to six weeks using BCI with tongue and functional electrical stimulations. Patients were scanned pre-, mid- and post-therapy. Group-level analyses compared mid- and post-therapy activation to pre-therapy using AFNI.

#### **RESULTS**

Normal and Stroke subjects showed supplementary motor area (SMA) and precentral gyrus activity in both MI and ME tasks. Stroke subjects showed mid-therapy activation increases that persisted post-therapy in the left SMA, premotor cortex, and cingulate during ME affected hand tapping, bilaterally in the cerebellar tonsils during MI affected hand tapping, in the left medial and superior frontal gyri and the cingulate during ME unaffected hand tapping, and in the right precuneus during MI unaffected hand tapping. Mid- therapy activation increased in the left sensorimotor cortex and SMA during MI tasks of the affected hand. Post-therapy activation increased in the left inferior frontal gyrus and insula during MI squeezing of the unaffected hand. All fMRI activity are reported at  $p < 0.05$ .

#### **CONCLUSION**

The results suggest that interventional therapy of the affected hand using BCI is associated with brain activity changes in specific areas involving both affected and unaffected hands. Persistent activation increases associated with ME and MI tasks of the affected hand may represent neuroplastic recovery. These data also suggest that some sensorimotor cortex changes may develop earlier while other changes take longer to emerge with BCI therapy.

#### **CLINICAL RELEVANCE/APPLICATION**

Characterizing changes in brain activation after stroke rehabilitation using brain-computer interface technology will provide insight into mechanisms of neuroplasticity associated with this therapy.