

1655 copies of viral RNA/mL. **DISCUSSION/SIGNIFICANCE OF IMPACT:** Our preliminary results are very promising, indicating that commercially available LFA can quantitatively measure HIV-p24 concentration to low levels. When coupled with our analysis of the relationship between HIV-p24 concentration and HIV RNA concentration, LFA may be a potential platform allowing us to estimate HIV viral burden at clinically relevant levels. Our next steps will be to evaluate this relationship in primary, clinical specimens in collaboration with the Tennessee Center for AIDS Research. We will incorporate technologies to improve the sensitivity of these LFA and evaluate their performance in field settings in Zambia. Our findings are broadly applicable for use in HIV care and treatment programs and early infant diagnosis programs around the world.

2536

The effect of skeletal muscle lipoprotein lipase overexpression on energy expenditure during weight loss maintenance and weight regain

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OBJECTIVES/SPECIFIC AIMS: Obesity is a rapidly growing epidemic and long-term interventions aimed to reduce body weight are largely unsuccessful due to an increased drive to eat and a reduced metabolic rate established during weight loss. Previously, our lab demonstrated that exercise has beneficial effects on weight loss maintenance by increasing total energy expenditure above and beyond the cost of an exercise bout and reducing the drive to eat when allowed to eat ad libitum (relapse). We hypothesized that exercise's ability to counter these obesogenic-impetuses are mediated via improvements in skeletal muscle oxidative capacity, and tested this using a mouse model with augmented oxidative capacity in skeletal muscle. **METHODS/STUDY POPULATION:** We recapitulated the exercise-induced improvements in oxidative capacity using FVB mice that overexpress lipoprotein lipase in skeletal muscle (mLPL). mLPL and wild type (WT) mice were put through a weight-loss-weight-regain paradigm consisting of a high fat diet challenge for 13 weeks, with a subsequent 1-week calorie-restricted medium fat diet to induce a ~15% weight loss. This newly established weight was maintained for 2 weeks and followed with a 24-hour relapse. Metabolic phenotype was characterized by indirect calorimetry during each phase. At the conclusion of the relapse day, mice were sacrificed and tissues were harvested for molecular analysis. **RESULTS/ANTICIPATED RESULTS:** During weight loss maintenance, mLPL mice had a higher metabolic rate ($p = 0.0256$) that was predominantly evident in the dark cycle ($p = 0.0015$). Furthermore, this increased metabolic rate was not due to differences in activity ($p = 0.2877$) or resting metabolic rate ($p = 0.4881$). During relapse, mLPL mice ingested less calories and were protected from rapid weight regain ($p = 0.0235$), despite WT mice exhibiting higher metabolic rates during the light cycle ($p = 0.0421$). **DISCUSSION/SIGNIFICANCE OF IMPACT:** These results highlight the importance of muscular oxidative capacity in preventing a depression in total energy expenditure during weight loss maintenance, and in curbing overfeeding and weight regain during a relapse. Moreover, our data suggest that the thermic effect of food is responsible for the differences in metabolic rate, because no differences were found in activity or resting metabolic rate. Additional studies are warranted to determine the molecular mechanisms driving the ability of oxidative capacity to assist with weight loss maintenance.

BIOMEDICAL INFORMATICS/HEALTH INFORMATICS

2048

Two EMR query strategies to assess prevalence of adrenal incidentaloma

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OBJECTIVES/SPECIFIC AIMS: To compare methods of ascertaining prevalence for adrenal incidentalomas **METHODS/STUDY POPULATION:** Retrospective electronic medical record study using Looking Glass Clinical Analytics (Streamline Health, Atlanta, GA, USA) at an urban university medical center. All patients with CT or MR imaging of the abdomen between 1997 and 2014

were identified. Patients with a documented diagnosis (ICD-9 code or problem list) for any history of adrenal disease were excluded. The prevalence of adrenal incidentalomas was ascertained by 2 different detection strategies: (1) documented diagnosis of adrenal incidentaloma or (2) imaging reports containing in the same sentence "adrenal" and "nodule*," "adenoma*," or "mass*," and not containing "no" and "adrenal" in the same sentence. Adrenal pathology surprise was further established in the second approach by excluding patients having previously undergone adrenal lab testing (cortisol, aldosterone, catecholamines, adrenocorticotropic hormone, renin) or having been registered in the cancer registry for any cancer excluding superficial skin cancers. **RESULTS/ANTICIPATED RESULTS:** In total, 194,624 individuals were identified in our initial search, from which 1056 were excluded for past adrenal disease (Table 1). Detection by the documented diagnosis method yielded 1578 cases (0.8%), compared with 13,697 cases (7.1%) by the imaging report method (Figure 1). Further restricting detection to true "Adrenal Surprise" by excluding those with any past adrenal lab testing and cancer history yielded 10,568 cases (6.1%). Validation studies for the 7.1% prevalence with 100 records revealed an adrenal incidentaloma positive predictive value (PPV) of 98%. When restricted to size ≥ 1 cm the PPV was 84%. **DISCUSSION/SIGNIFICANCE OF IMPACT:** Comparing our first strategy using documented diagnoses as criterion for incidentaloma as used in a recent paper by Lopez D (*Annals of Internal Medicine* 2016; 165: 533–542), we found a prevalence of 0.8% in our population similar to her 0.6%. However, when searching at the level of radiology report text, we found a prevalence ten-fold greater at 7.1%. Therefore, adrenal incidentalomas are more robustly identified by searching radiologic reports.

2085

MyResearchHome@Duke—launch and adoption of a portal for the research community

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OBJECTIVES/SPECIFIC AIMS: Describe (1) the features of the first release of Duke's myRESEARCHhome portal for researchers, and (2) the methods and results of adoption strategies **METHODS/STUDY POPULATION:** Through methods described previously (cite ACTS poster, 2016), the myRESEARCHhome portal team conducted a needs assessment to determine priorities for inclusion in the tool. Based on results of that assessment, the "minimal viable product" launched in June 2016 included the following features, organized into 9 distinct widgets: Access to all web-based research applications; ability to find and request research services; at-a-glance view of financial, protocol, and salary distribution information; access to financial and personnel reports; access to status of agreements and patents; access to CTSA-supported navigation services; visibility into required training and expiration dates; listing of announcements relevant to researchers; customized links area; ability to customize portal. The portal was developed using Ruby on Rails™, with a REACT grid framework. The development team, internal to Duke University, followed industry-standard best practices for development. After the initial release, the team employed several strategies to ensure awareness and adoption. Although written communications were an important factor for awareness, the presentations and hands-on studios proved most important. **RESULTS/ANTICIPATED RESULTS:** Use of the portal was directly related to in-person outreach efforts. There were small spikes after written communications, but strategies such as presentations, hands-on demonstrations, training sessions, and faculty meetings garnered the steady adoption rates. As of early January, 2017, almost 3000 users have interacted with the portal, with numbers rising steadily. There are an estimated 10,000+ faculty, staff, and trainees engaged in research at Duke. **DISCUSSION/SIGNIFICANCE OF IMPACT:** To maintain high adoption rates with the research community, engagement strategies must be ongoing. In addition to frequent in-person demonstrations, updates via written communications, and attendance at events, the portal team will employ a key adopt strategy—engaging the researchers in ongoing needs assessments. By maintaining the portal's relevance to the needs of the research community, the tool can better improve the efficiency of research at a large academic medical center.

2101

Addressing African American glaucoma through genetics and electronic health records

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OBJECTIVES/SPECIFIC AIMS: The overall goal of this project is to understand the genetic and clinical differences in POAG that specifically increase risk in

individuals of African genetic ancestry. We will approach this goal by completing the following objectives: (i) localize a genetic signal that accounts for the significantly increased risk for primary open-angle glaucoma in African Americans and (ii) utilize electronic health records (EHR) data to expand our understanding of risk to incorporate endophenotypes of glaucoma and other clinically recorded variables that may influence disease risk. **METHODS/STUDY POPULATION:** We will genotype at least 200 available African American samples with glaucoma on the Illumina Infinium[®] Expanded Multi-Ethnic Genotyping Array (MEGAEX) and perform admixture mapping. We will then access EHR data to expand our analysis beyond glaucoma to encompass other relevant risk modifiers captured in the clinical record. **RESULTS/ANTICIPATED RESULTS:** We anticipate localizing a genetic signal or signals that may account for the increased POAG risk in African Americans. Our calculations indicate that we have ~81% power to detect association at a LOD score of 2 and a risk ratio of 2. Thus, we are well-powered to detect a true signal at this modest level of association. **DISCUSSION/SIGNIFICANCE OF IMPACT:** This project will not only help to achieve precision medicine by filling in the gaps in knowledge regarding glaucoma in African Americans, but it will also address health disparities and aid in the realization of the full potential of “big data” so that all of these elements can be incorporated into a better understanding of health disparities.

2140

Estimating microscopic structures of glomeruli in renal pathology

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OBJECTIVES/SPECIFIC AIMS: (i) Digitally quantify pathologically relevant glomerular microcompartmental structures in murine renal tissue histopathology images. (ii) Digitally model disease trajectory in a mouse model of diabetic nephropathy (DN). **METHODS/STUDY POPULATION:** We have developed a computational pipeline for glomerular structural compartmentalization based on Gabor filtering and multiresolution community detection (MCD). The MCD method employs improved, efficient optimization of a Potts model Hamiltonian, adopted from theoretical physics, modeling interacting electron spins. The method is parameter-free and capable of simultaneously selecting relevant structure at all biologically relevant scales. It can segment glomerular compartments from a large image containing hundreds of glomeruli in seconds for quantification—which is not possible manually. We will analyze the performance of our computational pipeline in healthy and streptozotocin induced DN mice using renal tissue images, and model the structural distributions of automatically quantified glomerular features as a function of DN progression. The performance of this structural-disease model will be compared with existing visual quantification methods used by pathologists in the clinic. **RESULTS/ANTICIPATED RESULTS:** Computational modeling will reveal digital biomarkers for early proteinuria in DN, able to predict disease trajectory with greater precision and accuracy than manual inspection alone. **DISCUSSION/SIGNIFICANCE OF IMPACT:** Automated detection of microscopic structural changes in renal tissue will eventually lead to objective, standardized diagnosis, reflecting cost savings for DN through discovery of digital biomarkers hidden within numerical structural distributions. This computational study will pave the path for the creation of new digital tools which provide clinicians invaluable quantitative information about expected patient disease trajectory, enabling earlier clinical predictions and development of early therapeutic interventions for kidney diseases.

2166

Semantic characterization of clinical trial descriptions from ClinicalTrials.gov and patient notes from MIMIC-III

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OBJECTIVES/SPECIFIC AIMS: This poster presents a detailed characterization of the distribution of semantic concepts used in the text describing eligibility criteria of clinical trials reported to ClinicalTrials.gov and patient notes from MIMIC-III. The final goal of this study is to find a minimal set of semantic concepts that can describe clinical trials and patients for efficient computational matching of clinical trial descriptions to potential participants at large scale. **METHODS/STUDY POPULATION:** We downloaded the free text describing the eligibility criteria of all clinical trials reported to ClinicalTrials.gov as of July 28, 2015, ~195,000 trials and ~2,000,000 clinical notes from MIMIC-III. Using MetaMap 2014 we extracted UMLS concepts (CUIs) from the collected text. We calculated the frequency of presence of the semantic concepts in the texts

describing the clinical trials eligibility criteria and patient notes. **RESULTS/ANTICIPATED RESULTS:** The results show a classical power distribution, $Y = 2^{10} X^{(-2.043)}$, $R^2 = 0.9599$, for clinical trial eligibility criteria and $Y = 5^{13} X^{(-2.684)}$, $R^2 = 0.9477$ for MIMIC patient notes, where Y represents the number of documents in which a concept appears and X is the cardinal order of the concept ordered from more to less frequent. From this distribution, it is possible to realize that from the over, 100,000 concepts in UMLS, there are only ~60,000 and 50,000 concepts that appear in less than 10 clinical trial eligibility descriptions and MIMIC-III patient clinical notes, respectively. This indicates that it would be possible to describe clinical trials and patient notes with a relatively small number of concepts, making the search space for matching patients to clinical trials a relatively small sub-space of the overall UMLS search space. **DISCUSSION/SIGNIFICANCE OF IMPACT:** Our results showing that the concepts used to describe clinical trial eligibility criteria and patient clinical notes follow a power distribution can lead to tractable computational approaches to automatically match patients to clinical trials at large scale by considerably reducing the search space. While automatic patient matching is not the panacea for improving clinical trial recruitment, better low cost computational preselection processes can allow the limited human resources assigned to patient recruitment to be redirected to the most promising targets for recruitment.

2182

Developing a corpus for natural language processing to identify bleeding complications among intensive care unit patients

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OBJECTIVES/SPECIFIC AIMS: An accurate method to identify bleeding in large populations does not exist. Our goal was to explore bleeding representation in clinical text in order to develop a natural language processing (NLP) approach to automatically identify bleeding events from clinical notes. **METHODS/STUDY POPULATION:** We used publicly available notes for ICU patients at high risk of bleeding ($n = 98,586$ notes). Two physicians reviewed randomly selected notes and annotated all direct references to bleeding as “bleeding present” (BP) or “bleeding absent” (BA). Annotations were made at the mention level (if 1 specific sentence/phrase indicated BP or BA) and note level (if overall note indicated BP or BA). A third physician adjudicated discordant annotations. **RESULTS/ANTICIPATED RESULTS:** In 120 randomly selected notes, bleeding was mentioned 406 times with 76 distinct words. Inter-annotator agreement was 89% by the last batch of 30 notes. In total, 10 terms accounted for 65% of all bleeding mentions. We aggregated these results into 16 common stems (eg, “hemorr” for hemorrhagic and hemorrhage), which accounted for 90% of all 406 mentions. Of all 120 notes, 60% were classified as BP. The median number of stems was 5 (IQR 2, 9) in BP versus 0 (IQR 0, 1) in BA notes. Zero bleeding mentions in a note was associated with BA (OR 28, 95% CI 6.5, 127). With 40 true negatives and 2 false negatives, the negative predictive value (NPV) of zero bleeding mentions was 95%. **DISCUSSION/SIGNIFICANCE OF IMPACT:** Few bleeding-related terms are used in clinical practice. Absence of these terms has a high NPV for the absence of bleeding. These results suggest that a high throughput, rules-based NLP tool to identify bleeding is feasible.

2204

Evaluations of physiologic perturbations and their relationship with length of stay in neonatal hypoxic-ischemic encephalopathy

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OBJECTIVES/SPECIFIC AIMS: Neonatal hypoxic-ischemic encephalopathy (HIE) is frequently accompanied with physiologic perturbations and organ dysfunction. Markers of these perturbations and their associations with length of stay (LOS) are uncertain. To estimate the association between changes in selected physiologic and/or laboratory values with LOS in newborns with HIE. **METHODS/STUDY POPULATION:** Using the Children’s Hospitals Neonatal Database (CHND), we identified neonates with HIE at our center born ≥ 36 weeks’ gestation from 2010 to 2016. Those with major congenital anomalies were omitted. Infants uniformly received therapeutic hypothermia for 72 hours unless death occurred sooner. Inpatient vital signs and selected laboratory markers were collected from our institution’s health informatics,