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RESEARCH UPDATE

A semi-annual look at select research activities from across our organization

DLH is committed to advancing scientific research and delivering improved health outcomes. We bring together technology and scientific expertise to support initiatives aimed at advancing our understanding, prevention, diagnosis, and treatment of health conditions. Our team of researchers, epidemiologists, biostatisticians, and data scientists work each day to accelerate health interventions, enhance knowledge, and solve real-world public health challenges.

This collection highlights some of our most recent research activities from across our organization. Our experts rigorously pursue a deeper understanding of biological, clinical, and population health, transforming data into actionable insights. Utilizing cutting-edge technology and best-in-class data science, our researchers improve healthcare delivery, enhance quality of life, and promote health readiness.

The impact of our work is illustrated in the pages that follow, spanning a continuum of health areas:

- Breast cancer risk
- Environmental, social, and health burdens related to sleep health
- HIV transmission and detection
- Environmental exposure indicators for hypertension
- Infections and diseases among people with diabetes
- Associations between occupational exposures and hormone-related conditions

We thank the DLH researchers who contributed to this body of work for their vision, curiosity, and pursuit of excellence. Their expertise, integrity, and passion leave a lasting impact on the communities in which we live and work.

Brooke Pierce

President, Health



Association of Oil Spill–Related Volatile Organic Compound Exposure With CVD–Related Biomarkers in the Gulf Long–Term Follow–Up Study

DLH researchers **Kate Christenbury**, **Braxton Jackson**, and **Kaitlyn Lawrence** were among the authors of an [article](#) published in the *Annals of Work Exposures and Health* (Online: January 2026). During the Deepwater Horizon disaster in 2010, oil spill response and cleanup (OSRC) workers were exposed to crude oil, including benzene, toluene, ethylbenzene, xylene, and n-hexane (BTEX–H). Growing evidence links these exposures to cardiovascular disease (CVD). Lipid and C-reactive protein levels are used to assess CVD risk and may serve as mediators of the observed associations with CVD. However, few studies have assessed associations of oil spill cleanup–related exposures with blood levels of lipids and C-reactive protein (CRP). This study examined associations of oil spill cleanup–related exposure to each individual BTEX–H chemical, total (aggregate sum) BTEX–H, and the BTEX–H mixture with blood lipids and CRP among OSRC workers in the Gulf Long-term Follow-up (GuLF) Study. Subjects were comprised of 2,544 OSRC workers who completed a home visit (May 2011 to May 2013) and had CVD biomarker measurements. Cumulative exposures to BTEX–H (ppb-days) were estimated using a job-exposure matrix that linked air measurements with self-reported Deepwater Horizon work histories. Study biomarkers were lipids, including low-density lipoprotein cholesterol (LDL–C), high-density lipoprotein cholesterol (HDL–C), total cholesterol, and high-sensitivity CRP (hsCRP), which were measured in blood samples collected during the home visit. Each BTEX–H chemical was associated with elevations in total cholesterol up to 3 yr after exposure, with the strongest effect estimates in the top quartile, ranging from 2.3 to 5.1 mg/dL. A one quartile simultaneous increase in the BTEX–H mixture was associated with a 1.7 mg/dL increase in total cholesterol. The study suggests that oil spill cleanup–related BTEX–H exposures were associated with elevations in some CVD biomarkers. *The other authors include researchers from the UNC Gillings School of Global Public Health and the Epidemiology Branch of the National Institute of Environmental Health Sciences.*

Multiple Dimensions of Sleep in Relation to Cognition: A Nationally Representative Study of Asian, Black, Latine, and White US Adults Aged 40 Years and Older

DLH researchers **Christopher Payne** and **Braxton Jackson** were among the authors of an [article](#) published in *Sleep Health* (Online Ahead of Print: January 2026). Sleep disturbances can impair cognition, and cognitive impairment can dysregulate sleep–wake cycles. Despite biological plausibility, disparities in the sleep–cognition relationship are understudied in nationally representative samples. Using National Health Interview Survey data from 2011–2018, the authors investigated cross-sectional associations between sleep and cognition among adults aged ≥ 40 years overall and by age, sex, race, and ethnicity. Participants self-reported sleep duration (short [< 7 -hours], long [> 9 -hours]); insomnia symptoms (trouble falling asleep or staying asleep ≥ 3 times/week); and non-restorative sleep (waking feeling unrested ≥ 4 days/week). Cognitive impairment was defined as “not being able to/having a lot of difficulty remembering or concentrating” based on the Washington Group Short Set on Functioning. Among 73,477 adults (mean age $\pm$ standard error 58.3 ± 0.07 years), 31.8% reported short sleep, 4.1% long sleep, 35.7% insomnia symptoms, and 35.5% non-restorative sleep. Overall, 2.2% reported cognitive impairment. All sleep dimensions were associated with a higher prevalence of cognitive impairment. Short sleep, insomnia symptom, and non-restorative sleep were more strongly associated with cognitive impairment among middle-aged adults. Associations with long sleep were stronger among older adults. Differences by sex were not observed. While the prevalence of cognitive impairment was slightly higher among Hispanic/Latine and Black adults, associations with short sleep were strongest among White adults and among Asian

adults for long sleep. Sleep disturbances were associated with cognitive impairment. Most associations were stronger among middle-aged adults, although future studies with objective measures are warranted. *The other authors are researchers from the National Institute of Environmental Health Sciences and the National Institute on Minority Health and Health Disparities.*

History of Cannabis Smoking and Subjective Cognitive Complaints in Older Women

DLH researcher **Aimee D'Aloisio** was among the authors of an [article](#) published in *Neuroepidemiology* (Online Ahead of Print: January 2026). Cannabis use has been increasing in the U.S., yet its potential long-term effects on neurocognitive outcomes remain unknown. The authors aimed to examine the association of the history of cannabis smoking with subjective cognitive complaints (SCC) in older women. This prospective cohort analysis included 15,378 older women (age ≥65 years) of the U.S. from the National Institute of Environmental Health Sciences' Sister Study. Participants reported their history of cannabis smoking at enrollment (2003–2009) and completed the Eight-item Interview to Differentiate Aging and Dementia (AD8) as an SCC screener at the cohort's 2nd (2011–2014), 3rd (2014–2016), and 4th (2017–2019) follow-ups. Overall, 3,973 (25.8%) women reported ever smoking cannabis, mostly in their early adulthood. Compared with never cannabis smokers, the multivariable odds ratios (ORs) for ever smokers were 1.27 at the 2nd follow-up, 1.28 at the 3rd follow-up, and 1.30 at the 4th follow-up. Associations were stronger for regular than occasional cannabis smokers. For example, at the 2nd follow-up, the OR was 1.61 for regular smokers and 1.19 for occasional smokers. Results were overall consistent in subgroup and sensitivity analyses. This study suggests a potential association between a history of cannabis smoking and SCC in older women, calling for further research on cannabis use and cognitive outcomes in the context of aging. *The other authors are researchers from the Department of Epidemiology and Biostatistics/ College of Human Medicine at Michigan State University, the School of Public Health at Shandong First Medical University and Shandong Academy of Medical Sciences (China), and the National Institute of Environmental Health Sciences.*

Pesticides Associated With Incident Diabetes Among Licensed Private Pesticide Applicators in the Agricultural Health Study Cohort (1993–2021)

DLH researcher **Jesse Wilkerson** was among the authors of an [article](#) published in *Environment International* (Epub: January 2026; Online: February 2026). Growing evidence suggests pesticides may increase risk of type 2 diabetes, but data are limited on many specific chemicals. In 29,527 private pesticide applicators in the Agricultural Health Study cohort (enrolled 1993–1997 in Iowa and North Carolina), 3,847 incident diabetes cases were identified by self-report during follow-up surveys in 1999–2003, 2005–2010, 2013–2015, and 2019–2021. The authors examined 50 pesticides reported at enrollment, updated in 1999–2003 or 2005–2010, prior to diabetes diagnosis or end of follow-up, using log-binomial regression to calculate relative risks (RR) and 95% confidence intervals (CI) for ever-use and intensity-weighted lifetime days (IWLD) use (tertiles, T1–3), adjusting for covariates and correlated pesticides. Greater diabetes risk was associated with seven organochlorine insecticides: ever-use of DDT, aldrin, dieldrin, chlordane, heptachlor, and toxaphene, without monotonic exposure-response trends, and lower IWLD of lindane use. Risk was associated with five organophosphate or carbamate insecticides: ever-use of diazinon and carbofuran, and exposure-response trends for malathion, phorate, and carbaryl. Risk was associated with two phenoxy herbicides, 2,4,5-T and 2,4,5-TP, and three other herbicides [butylate, metribuzin, chlorimuron ethyl], and the fumigant carbon tetrachloride/disulfide. Associations were not confounded by BMI and weight gain. These

results show greater diabetes risk associated with use of persistent organochlorine insecticides and banned phenoxy herbicides. Novel findings for widely used insecticides and other pesticides warrant further investigation. *The other authors include researchers from the Epidemiology Branch of the National Institute of Environmental Health Sciences, the University of Texas Health Science Center at Houston School of Public Health, and the Division of Cancer Epidemiology and Genetics at the National Cancer Institute.*

Challenging Additivity: Comparing Predicted and Observed AhR Activity of Polycyclic Aromatic Compound (PAC) Mixtures Containing Active and Inactive Constituents

DLH researcher **Shawn Harris** was among the authors of an [article](#) published in *Environmental Science & Technology* (Epub: January 2026; Print: February 2026). Class-based cumulative risk assessment approaches have been applied to high-priority environmental contaminants such as polycyclic aromatic compounds (PACs), yet uncertainties remain in their application. In this study, the authors evaluated the influence of inactive chemicals on mixture modeling outcomes and explored strategies for predicting the aryl hydrocarbon receptor (AhR)-mediated toxicity of PAC mixtures. Using an in vitro AhR reporter gene assay, the authors tested seven defined mixtures composed of six active and seven inactive PACs. Observed concentration-response curves were compared to predictions from three established mixture models, concentration addition (CA), independent action (IA), and generalized concentration addition (GCA), using both effective concentration eliciting 10% response (EC10) and benchmark concentration (BMC10) approaches. Including inactive chemicals without scaling led to consistent overestimation of potency, especially in models assuming equal efficacy. Predictive accuracy improved across all models when mixtures were limited to active chemicals and contributions were scaled to 100%, excluding inactives. Among approaches, GCA consistently produced the best agreement with measured responses, particularly when paired with BMC modeling. BMC10 values better accommodate partial agonists. Findings support a pragmatic, mechanism-based framework for modeling environmental mixtures, one that prioritizes active components, scales their contributions, and adopts BMC-based methods to estimate potency. *The other authors include researchers from the Healthy Environments and Consumer Safety Branch at Health Canada, the Division of Translational Toxicology at the National Institute of Environmental Health Sciences, and the Center for Public Health and Environmental Assessment at the U.S. Environmental Protection Agency.*

Association Between Noise Pollution Exposure and Incident Breast Cancer in the Sister Study

DLH researcher **Che-Jung Chang** was among the authors of an [article](#) published in *Environmental Research* (Epub: January 2026; Online: March 2026). Noise exposure may contribute to cancer risk via disrupting sleep patterns and the autonomic nervous system. While modest positive associations between noise exposure and breast cancer incidence were observed in Europe, no study has been done in the United States. The authors examined the association between noise exposure and incident breast cancer in a large nationwide prospective cohort of women in the U.S. Included were 46,809 participants in the Sister Study (ages 35–74, enrolled 2003–2009). Median daytime and nighttime anthropogenic noise at the participants' baseline residence was estimated using a U.S. National Park Service noise model. Cox proportional hazards models estimated hazard ratios (HRs) and 95% confidence intervals (CIs) for the association between incident breast cancer and exposure to noise by quartiles and per 10 dB increase, adjusted for sociodemographic and urbanicity-related factors and stratifying by estrogen receptor (ER) status. During an average of 12.5 years of follow-up, 4,271 breast cancer cases were diagnosed. Higher daytime noise exposure was associated with higher breast cancer

incidence, while nighttime noise showed weaker associations. Associations for ER+ tumors were slightly elevated for both daytime and nighttime noise. The authors observed a positive association between daytime noise exposure and breast cancer incidence in a large U.S cohort. Further research incorporating improved exposure assessment is needed to better understand this relationship. *The other authors include researchers from the University of North Carolina at Chapel Hill, the National Institute of Environmental Health Sciences, the Center for Occupational and Environmental Health at the University of California Davis, and the National Cancer Institute.*

Occupational Exposures Among Hairdressers and the Occurrence of Hormone-Related Conditions

DLH researcher **Che-Jung Chang** was among the authors of an [article](#) published in *Occupational and Environmental Medicine* (Print: February 2026). The objective was to investigate the association between hairdresser exposures and hormone-related conditions. Using data from 50,800 eligible Sister Study participants (enrolled 2003–2009, aged 35–74 years), the authors estimated ORs and 95% CIs for associations between ever working as a hairdresser (n=1803) and prevalent fibroids, endometriosis, hysterectomy, and oophorectomy. The authors estimated HRs and 95% CI for incident fibroids, endometriosis, breast, uterine, and ovarian cancers among ever hairdressers versus never hairdressers. Also examined were the associations of hormone-related diseases and professional use of products such as bleach, perms, chemical straighteners, permanent hair color, hairspray, barbiticide, formaldehyde, and alcohol, comparing data from 985 long-term hairdressers who worked ≥ 2 years to non-long-term hairdressers (never workers and those working < 2 years). Ever-hairdressers were more likely than never-hairdressers to have had a prebaseline hysterectomy. Hysterectomies were more common among long-term hairdressers with more frequent applications of perms, chemical straighteners, and permanent hair color compared with less frequent applicators or never hairdressers. Ever-hairdressers had higher rates of incident endometriosis (477 cases) compared with never-hairdressers, but there were no notable associations between working as a hairdresser and fibroids (1805 cases), breast cancer (4628 cases), ovarian cancer (300 cases), or uterine cancer (447 cases). In race-stratified analyses, Black hairdressers were more likely to be diagnosed with fibroids than Black never-hairdressers (201 cases). Conclusions: Hairdresser occupation was associated with increased odds of hysterectomy and increased rates of incident endometriosis and possibly fibroids among Black women. *The other authors are researchers from the National Institute of Health Sciences (Durham) and the University of North Carolina at Charlotte.*

Adaptation of a Protocol to Evaluate Online Recruitment Strategies for Mailing HIV Self-Tests and Pilot an Intervention to Improve Linkage to HIV Prevention and Care Among Transgender Women: Protocol for a Randomized Controlled Trial

DLH researcher **Evelyn Olansky** was among the authors of an [article](#) published in *JMIR Research Protocols* (Online: February 2026). Transgender women are disproportionately affected by HIV in the United States. Evidence shows that HIV self-testing increases awareness of HIV status, preventing transmission. Culturally appropriate strategies are needed to provide HIV self-tests (HIVSTs) to transgender women. This paper aims to describe an adaptation for transgender women of a comparative effectiveness trial of an intervention (Know@Home website) on the use of HIVSTs, counseling, and linkage of participants to appropriate services initially designed to reach Black or African American and Hispanic or Latino men who have sex with men (Implementation of Rapid HIV

Self-Testing Among MSM Project). The ADAPT-ITT (Assessment, Decision, Adaptation, Production, Topical Experts, Integration, Training, and Testing) framework guided the adaptation. Project staff worked with consultants and a community advisory board to revise all study materials (i.e., intervention web content, marketing text and images, and language used in the surveys) to be tailored to, and inclusive of, health topics relevant to transgender women. The authors conducted a pilot study with transgender women recruited through online venues. Participants were randomly assigned 2:1 to the intervention arm or control arm. All participants were mailed 2 HIVSTs, the OraQuick In-Home HIV Test, and had access to a standard resource list including information on how to find a nearby testing location, HIV prevention, and sexual health. Only intervention arm participants had access to the study website, "Know@Home.org." The Know@Home website allowed participants in the intervention arm to order sexually transmitted infection test kits, condoms, and lubricant and provided HIV prevention information, service locators, and risk assessment tools. Adaptations to the intervention included modifying language, images, and links to outside resources to be transgender specific or gender neutral. Online surveys were adapted by removing inappropriate gender terms and replacing them with culturally appropriate terms for gender identity, genitalia, and condom use. Four months after completing the baseline (enrollment) survey, all participants were asked to complete a final follow-up survey. Upon completing the 4-month survey, participants were mailed a dried blood spot collection kit to be returned by mail for the laboratory testing of the sample. The results of all HIVSTs could be reported in real time in an online survey. Video health counseling was available, upon request, for all participants during study participation. Enrollment into the pilot study began on April 22, 2021, and concluded on July 7, 2021, yielding a total of 102 transgender women participants, with data collection completed in January 2022. By using the ADAPT-ITT model, the authors produced materials to be culturally and linguistically appropriate for transgender women. The findings of this study have the potential to inform future research studies among transgender women and underscore the importance of involving subject matter experts and community members in the development of tailored materials. *The other authors include researchers from the Department of Epidemiology at Emory University and the Medical School and Department of Health Behavior and Clinical Sciences at the University of Michigan.*

Impact of COVID-19 Monoclonal Antibody Therapy on Subsequent Vaccine-Elicited SARS-CoV-2 Immune Responses

DLH researcher **Preeti Dhillon** was among the authors of an [article](#) published in *The Journal of Infectious Diseases* (Online Ahead of Print: February 2026). How anti-SARS-CoV-2 monoclonal antibodies (mAbs) change subsequent vaccine responses remains uncertain. The authors conducted a prospective, phase IV, open-label study of adults who received mRNA-1273 or BNT162b2. Cohort 1 included outpatients with acute COVID-19 previously randomized to mAbs (tixagevimab/cilgavimab or amubarvimab/romlusevimab), camostat, or placebo in ACTIV-2/A5401. Cohort 2 included unvaccinated adults without reported prior COVID-19 and was analyzed as naïve or non-naïve by baseline neutralizing antibodies (nAbs). The authors measured binding IgG, nAbs, spike-specific memory B cells, and CD4+/CD8+ T cells at baseline and days 28, 56, and 140. Forty-three participants were analyzed. At day 140, nAb titers were lower among prior mAb recipients and COVID-19-naïve participants than among placebo/camostat recipients and those with evidence of prior infection. RBD-specific, but not spike-specific, memory B cells were reduced after prior mAb therapy at days 56 and 140. Frequency of spike-specific CD4+ and CD8+ T-cell responses did not differ by prior mAb exposure.

Adverse events were mostly grade 1–2 and consistent with vaccine trials. Prior anti-SARS-CoV-2 mAb treatment limits endogenous RBD-focused B-cell responses to later mRNA vaccination without measurably affecting T-cell immunity. Timing of vaccination after mAb therapy may matter and warrants study. *The other authors include researchers from the Center for Vaccine Research and Pandemic Preparedness, Department of Microbiology, and Precision Immunology Institute at the Icahn School of Medicine at Mount Sinai, and the National Institute of Allergy and Infectious Diseases.*

Tecovirimat for the Treatment of Mpox

DLH researcher **Lara Hosey** was among the authors of an [article](#) published in *The New England Journal of Medicine* (Print: February 2026). Tecovirimat is approved for smallpox treatment under the Food and Drug Administration Animal Rule on the basis of efficacy in nonhuman primate models of mpox (previously known as monkeypox). However, the clinical efficacy of tecovirimat against human clade II mpox is unclear. In a phase 3, international, double-blind, randomized, placebo-controlled trial, the authors evaluated the efficacy of oral tecovirimat in adults with laboratory-confirmed clade II mpox. Participants were randomly assigned in a 2:1 ratio to receive tecovirimat or placebo for 14 days. The primary outcome was clinical resolution, assessed in a time-to-event analysis in participants with active skin or mucosal lesions. Secondary outcomes included reduction in pain, assessed in all participants with laboratory-confirmed mpox and in those with severe pain at baseline (pain score, 7 to 10; scale, 0 [no pain] to 10 [worst pain imaginable]); complete lesion healing (assessed in a time-to-event analysis); viral DNA clearance; and safety. Of 412 participants who underwent randomization (275 to tecovirimat and 137 to placebo), 344 had laboratory-confirmed mpox, and 336 had active skin or mucosal lesions and were included in the primary analysis. By day 29, the estimated cumulative incidence of clinical resolution was 83% with tecovirimat and 84% with placebo; the competing-risks hazard ratio for clinical resolution was 0.98. No substantial between-group differences were seen in pain reduction among participants with severe pain (difference, 0.1 point), in complete lesion healing (competing-risks hazard ratio, 0.97), or in viral DNA clearance. The incidence of adverse events of grade 3 or higher was similar in the two groups (4% with tecovirimat and 3% with placebo). This trial showed no evidence that tecovirimat therapy shortened the time to clinical resolution, reduced pain, or increased viral clearance among adults with clade II mpox. *The other authors include researchers from the Division of AIDS at the National Institute of Allergy and Infectious Diseases, the Division of Infectious Diseases at Columbia University Irving Medical Center, the Institute for Global Health and Infectious Diseases at the University of North Carolina at Chapel Hill, the Center for Biostatistics in AIDS Research at Harvard T.H. Chan School of Public Health, and Johns Hopkins University School of Medicine.*

Cabotegravir Plus Rilpivirine for Persons With HIV and Adherence Challenges

DLH researcher **Chanelle Wimbish** was among the authors of an [article](#) published in *The New England Journal of Medicine* (Print: February 2026). Randomized trials of long-acting injectable antiretroviral therapy (ART) in persons with human immunodeficiency virus (HIV) who face challenges with adherence to oral medication are lacking. The authors conducted an open-label, randomized trial involving persons with HIV who had inadequate adherence to ART (a persistent HIV-1 RNA level of >200 copies per milliliter or loss to follow-up). Participants received up to 24 weeks of adherence support, conditional economic incentives, and standard care with oral ART (step 1). Participants who had an HIV-1 RNA level of 200 copies per milliliter or lower in step 1 were randomly assigned in a 1:1 ratio to either continue standard care or switch to monthly injections of long-acting

cabotegravir plus rilpivirine with or without oral lead-in therapy (step 2). The primary outcome was regimen failure, defined as confirmed virologic failure (two consecutive HIV-1 RNA measurements of >200 copies per milliliter) or treatment discontinuation during step 2. In step 1 of the trial, 453 participants were enrolled; the median age was 40 years, 63% were Black, and 29% had been assigned female sex at birth. In step 2, a total of 306 participants underwent randomization; 152 were assigned to receive cabotegravir–rilpivirine and 154 to receive standard care. Step 2 randomization was stopped early on the basis of the superiority of cabotegravir–rilpivirine to standard care in secondary outcomes at a prespecified analysis performed after a median follow-up of 48 weeks. The cumulative incidence of regimen failure by week 48 was 22.8% in the cabotegravir–rilpivirine group and 41.2% in the standard-care group. The cumulative incidence of an adverse event was 43.5% in the cabotegravir–rilpivirine group and 42.4% in the standard-care group. Resistance-associated mutations developed in two participants with confirmed virologic failure in each group. Monthly injections of long-acting cabotegravir–rilpivirine were superior to standard oral ART in reducing the risk of regimen failure among persons with HIV who had adherence challenges. *The other authors include researchers from the Division of AIDS at the National Institute of Allergy and Infectious Diseases, the University of Colorado Anschutz Medical Campus, the National Institute of Mental Health, and the University of California at Los Angeles David Geffen School of Medicine.*

EpiSmokEr2: A Robust Epigenetic Classifier for Smoking Status Inference Using Illumina EPIC Methylation Data

DLH researcher **Kaitlyn Lawrence** was among the authors of an [article](#) published in *Epigenomics* (Epub and Print: February 2026). Tobacco smoking induces persistent DNA methylation (DNAm) changes in blood that can serve as long-term biomarkers for smoking exposure. The authors aimed to develop and validate a DNAm classifier of smoking status using Illumina EPIC array data. The authors built Epigenetic Smoking status Estimator2 (EpiSmokEr2), a Least Absolute Shrinkage and Selection Operator (LASSO) regression-based DNAm classifier using 511 CpGs from Illumina Infinium MethylationEPIC array (EPIC) data. The model was trained on 1343 samples from the Young Finns Study cohort and validated across six independent datasets from four cohorts and two array platforms (EPIC and EPICv2). EpiSmokEr2 achieved an average sensitivity of 0.87 and specificity of 0.86 in distinguishing current from never smokers. Predicted smoking status correlated strongly with established DNAm smoking scores and GrimAge, indicating its ability to capture biologically relevant smoking effects. Simulation analysis showed EpiSmokEr2 was robust for up to 10% missing CpGs. EpiSmokEr2 provides a reliable DNAm-based estimator of smoking status. It is available as an open-source R package on GitHub, facilitating broad use in epidemiological and clinical research. *The other authors include researchers from the Helsinki Institute of Life Science (HiLIFE) at the University of Helsinki, the University of Turku and Turku University Hospital (Finland), and the Epidemiology Branch at the National Institute of Environmental Health Sciences.*

Brief Report: National HIV Molecular Cluster Detection Supports Local Cluster Detection

DLH researcher **Mary Plaster** was among the authors of an [article](#) published in the *Journal of Acquired Immune Deficiency Syndromes* (Online Ahead of Print: February 2026; Online: June 2026). CDC and state/local health departments analyze HIV sequences to identify molecular clusters representing rapid transmission. Local analyses can be timelier, but are limited to sequences available in the local surveillance system, and thus may miss all or part of clusters spanning multiple jurisdictions. The authors assessed the added value of national analyses for clusters missed or only partially detected by local analyses. National quarterly analyses of HIV sequences (September 2021–June 2023) that identified priority

clusters (defined as ≥ 5 diagnoses in the past 12 months within a genetic distance of ≤ 0.005 substitutions per site among people with HIV diagnosed during the most recent three years) were reviewed. For each cluster, the authors simulated whether and when single-jurisdiction analysis would meet priority threshold and calculated the proportion of cluster members that could be identified locally. Of 149 clusters detected in the national analysis, 91 (61%) clusters would have been detected concurrently by local analysis, 27 (18%) would have delayed detection (median: 59 days), and 31 (21%) would not have been detected locally. In clusters detected by both approaches, an average of 91% of cluster members identified in the national analysis would have also been identified in the local analysis. National analyses detected clusters that local analyses missed, identified additional cluster members, and found certain clusters earlier. National cluster detection plays a vital role in enhancing local detection activities. *The other authors are researchers from the National Center for HIV, Viral Hepatitis, STD, and TB Prevention at the Centers for Disease Control and Prevention as well as the Oak Ridge Institute for Science and Education.*

Standardized Interoperable Data Collection for Myositis Research: Developing Expert Consensus on Common Data Elements for Myositis Outcome Measures

DLH researchers **Varsha Surampudi**, **Mark Bodkin**, and **Audrey Kessel** were among the authors of an [article](#) published in *Arthritis Care & Research* (Online Ahead of Print: March 2026). Recent progress has been made in developing validated myositis outcome measures. However, critical deficiencies remain for data standardization across myositis registries. While the National Institutes of Health (NIH) Common Data Elements (CDE) Repository has been developed to facilitate standardized data collection and sharing, few myositis-specific CDEs currently exist. The authors developed CDEs for myositis outcome measures using novel data science strategies. Data dictionaries of myositis registries were examined to understand how outcome measures are currently captured. The authors used the Linked data Modeling Language (LinkML), an open-source data modeling framework, to develop computable CDEs. After drafting CDEs for myositis core set activity measures (CSMs), an international conference was held with an expert myositis panel to reach consensus on the coding of CDEs and prioritize additional measures for CDE creation, using Delphi and modified nominal group techniques. This workflow was repeated for the prioritized measures in the second phase. A workflow was established for CDE creation. CDEs for 10 myositis CSMs were drafted for the first conference (November 2024). After receiving comments to modify the coding, universal agreement among participants was reached for CSM CDEs. The prioritized measures for future CDEs included myositis response and classification criteria, damage measures, physical function measures, and PROMIS instruments. CDEs for 18 additional measures were discussed at a second consensus conference (March 2025). Similarly high agreement rates were achieved, except for flare criteria. Altogether, 852 new CDEs were created for 27 myositis forms and achieved consensus, readying their deposit in the NIH CDE Repository. Leveraging multispecialty expertise in myositis and its patient communities and data science expertise of the National Library of Medicine, the first myositis-specific CDEs have been developed to accelerate the ability to conduct interoperable myositis clinical studies and therapeutic trials. The workflow established here should also benefit creation of CDEs and data sharing for other autoimmune diseases. *The other authors include researchers from the National Library of Medicine at the National Institutes of Health, the National Institute of Environmental Health Sciences, the National Institute of Arthritis Musculoskeletal and Skin Diseases, and Johns Hopkins University School of Medicine, as well as researchers from institutes in Sweden, France, the U.K., the Netherlands, Canada, Italy, and Germany.*

Comparative Investigation of the Potential of Glyphosate and Glyphosate-Based Formulations to Cause Oxidative Stress and DNA Damage in Human Skin and Liver Cell Systems

DLH researchers **Caroll Co**, **Guanhua Xie**, and **Shawn Harris** were among the authors of an [article](#) published in *Toxicological Sciences* (Online Ahead of Print: March 2026). Glyphosate is an herbicide found worldwide in glyphosate-based formulations (GBFs). Although glyphosate appears to have a low toxicity profile for humans and mammals, conflicting reports exist regarding the risk for cancer in humans. U.S. EPA and European regulatory agencies have described glyphosate as unlikely to pose a carcinogenic hazard to humans. However, the International Agency for Research on Cancer (IARC) classified glyphosate as “probably carcinogenic to humans (Group 2A),” citing “mechanistic data provide strong evidence for genotoxicity and oxidative stress.” Given these discrepancies, the Division of Translational Toxicology at NIEHS designed an experimental strategy to expand mechanistic evidence and address critical gaps within existing literature (e.g., mechanistic evaluations of glyphosate alongside GBFs, inclusion of context-defining positive controls). Cell morphology, viability, H₂O₂ and γ -H2AX formation were assayed in human keratinocytes (HaCaT), previously cited by IARC, and human hepatocytes (HepaRG™) to derive benchmark concentrations and fold-change response metrics. The authors’ findings revealed glyphosate alone was weakly and inconsistently bioactive for oxidative stress and DNA damage when compared to positive controls. In contrast, most of the 13 GBFs evaluated were more clearly bioactive with no apparent correlation to varied glyphosate concentrations. Hierarchical clustering of biological responses revealed some bioactive GBFs to cluster near well-characterized positive controls for oxidative stress, while four GBFs clustered more similar to negative controls and glyphosate. Collectively, this study provides a robust dataset with context-defining results that advance our understanding of the hazard potential of GBFs while revealing glyphosate is likely not a primary driver of oxidative stress from GBF exposures. *The other authors include researchers from the Division of Translational Toxicology and the Biostatistics and Computational Biology Branch at the National Institute of Environmental Health Sciences.*

Infections Associated With Diabetes

DLH senior epidemiologist and researcher **Sarah Casagrande** served as an editor for an [article](#) published in *Diabetes in America*, a National Institute of Diabetes and Digestive and Kidney Diseases compilation and assessment of epidemiologic, public health, clinical research, and clinical trial data focused on diabetes, its complications and treatment, health care utilization, and diabetes prevention in the United States. (Online: March 2026). *Excerpt:* Evidence from centuries of clinical practice supports the relationship between diabetes and infections. Possible mechanisms include the effect of hyperglycemia on the immune system, increased risk of local tissue ischemia, neuropathy, and the association of diabetes with other comorbidities, such as obesity and heart failure, that independently increase the risk of infection. Individuals with diabetes are more likely to develop certain infections compared to those without diabetes, including urinary tract infections (such as asymptomatic bacteriuria, pyelonephritis, renal and perinephric abscess), respiratory tract infections, sepsis, lower extremity infections, deep subcutaneous tissue infections, and tuberculosis. In addition, several rare but serious infections occur almost exclusively in people with diabetes, including necrotizing otitis externa, rhinocerebral mucormycosis, emphysematous pyelonephritis, and Fournier’s gangrene. Though it remains unclear whether diabetes is associated with a higher risk of acquiring COVID-19, evidence suggests diabetes is associated with significantly elevated risk of severe and fatal complications from the infection. In the United States in 1999–2023, the age-standardized percentage of deaths with any infection ranged from 2.3% to 16.8% in persons with

diabetes compared with 3.5% to 14.6% in persons without diabetes, with respiratory tract infections accounting for the highest percentage of deaths in both groups. In addition, during 1999–2021, the age-standardized percent of hospital discharges listing any infection ranged from 19.5% to 34.9% in persons with diabetes compared with 12.1% to 23.4% in persons without diabetes. Skin and connective tissue infections were the most common for individuals with diabetes, while respiratory tract infections accounted for the highest percentage of hospital discharges in those without diabetes. Individuals with diabetes who develop infections face higher rates of hospital admission, longer stays, and more complications, which in turn increase healthcare costs. This article summarizes the body of evidence on the relationship between diabetes and infectious disease risks and outcomes. It also outlines implementation strategies to facilitate adoption of evidence-based care for diabetes-related infections.

Longitudinal Study of Comorbidities and Clinical Outcomes in Persons With Pancreatic Disease Using Electronic Health Records

DLH researchers **Jane Der** and **Constance Ruhl** were among the authors of an [article](#) published in *Pancreas* (Online Ahead of Print: March 2026; Online: August 2026). The authors examined comorbidities and clinical outcomes among persons with pancreatic disease using electronic health records (EHR). In this retrospective study of 1,039,035 adults, pancreatic disease was defined by ICD-9 or ICD-10 codes using Optum® longitudinal EHR from January 2007 through December 2023. Demographics, diagnosis, prescription, and vital sign records were obtained and associations with chronic pancreatitis, pancreatic cancer, and mortality were evaluated. Among patients with pancreatic disease, 17.6% had a chronic pancreatitis diagnosis during study follow-up and chronic pancreatitis was associated with male sex, Black race, lower BMI, acute pancreatitis, other pancreatic disease, diabetes, hypertension, chronic liver disease, gastroesophageal reflux disease, depression or anxiety, abdominal pain, and alcohol dependence. A pancreatic cancer diagnosis was identified during follow-up among 12.1% of patients with pancreatic disease and pancreatic cancer was associated with older age, male sex, lower BMI, chronic pancreatitis, other pancreatic disease, diabetes, cancers except primary liver and colorectal, and abdominal pain. Blacks and Asians were less likely to have pancreatic cancer compared with Whites. Mortality among patients with pancreatic disease was 28.8% compared with 9.7% for the whole EHR sample. Mortality was associated with older age, male sex, Black race, lower BMI, pancreatic cancer, diabetes, hypertension, ischemic heart disease, other cancers, chronic liver disease, depression or anxiety, and alcohol dependence. *Conclusions:* In this EHR analysis of patients with pancreatic disease, chronic pancreatitis and pancreatic cancer diagnoses were frequent and mortality was higher compared with the whole EHR sample. Metabolic dysfunction-associated clinical outcomes were common among persons with pancreatic disease. *The other author is a researcher from the National Institute of Diabetes and Digestive and Kidney Diseases.*

Personalized Environment and Genes Study (PEGS) Dataset—A Resource for Genomic, Exposomic, and Geospatial Data

DLH researchers **Samantha Shuptrine** and **Nathaniel MacNell** were among the authors of an [article](#) published in *Scientific Data* (Online: April 2026). The article describes the Personalized Environment and Genes Study (PEGS), a unique resource comprising genetic and environmental exposure data linked to geospatial data. The PEGS cohort contains 19,445 demographically diverse participants who provided phenotype and exposure data by completing three surveys. Whole-genome sequencing was performed for a

subset of 4,737 participants to interrogate common and rare variants and structural variations, including high-resolution human leukocyte antigen (HLA) variants. Geographic coordinates were assigned to participant addresses, enabling the use of distance to contaminant sources and area-level air-pollutant concentrations as surrogates for exposure. Several tools are available to explore these data and the results of exposome-wide association studies (ExWAS) conducted using the data. The i2b2 Query and Analysis Tool enables approved users to build customizable queries for exploring basic statistics from de-identified and aggregated PEGS data. PEGS Explorer allows users to explore published ExWAS results and rigorously calculated exposure correlations. Globe visualizations in this tool reflect the complex mixtures involved in the exposome and allow users to visualize correlations between exposures and common, complex diseases. *The other authors include researchers from the National Institute of Environmental Health Sciences, the Mayo Clinic, and the National Institute on Aging.*

The Association Between PFAS Exposure, Menstrual Cycle Parameters, and Reproductive Hormones in Adolescent Girls

DLH researchers **Samantha McNeley** and **Sheri Denslow** were among the authors of an [article](#) published in *The Journal of Clinical Endocrinology and Metabolism* (Online Ahead of Print: April 2026). Perfluoroalkyl and polyfluoroalkyl substances (PFAS), sometimes referred to as “forever chemicals,” are widespread. Certain PFAS exposures have been associated with reproductive abnormalities in women but limited data exist in adolescents. The objective was to investigate the relationship between PFAS, menstrual cycle length/variability, and reproductive hormones in adolescents. Thirty-eight girls completed menstrual diaries and contributed daily urine samples to measure creatinine (Cr)-corrected luteinizing hormone (LH), estrone-3-glucuronide (E1G), and pregnanediol-3-glucuronide (PdG). Twenty-four PFAS were measured (n=88 serum samples, average 2.32 samples/participant over the course of 1.20 ± 1.34 years) using mass spectrometry. Linear mixed effects models were used to assess associations between PFAS and total cycle, follicular phase, and luteal phase lengths and hormone levels. Models were performed unadjusted and adjusted for gynecologic age, body fat percent, and race/ethnicity. Participants were 12.8 ± 1.0 years old (mean $\pm$ SD) with a gynecologic age of 0.3 ± 0.2 years. Most were non-Hispanic White and of normal weight. Four PFAS were consistently detected: perfluorobutanesulfonic acid (PFBS), perfluorohexanesulfonic acid (PFHxS), perfluorooctanoic acid (PFOA), and perfluorooctanesulfonic acid (PFOS). There were no associations between PFAS and cycle length or variability. Conclusion: PFAS were widely detected in healthy girls. PFBS was positively associated with E1G levels, suggesting potential ovarian effects. Analyses are ongoing to understand PFAS exposure sources and to determine if ongoing exposure may impact reproductive health. *The other authors include researchers from the National Institute of Environmental Health Sciences and the U.S. Environmental Protection Agency.*

Environmental, Social, and Health Burdens in Relation to Sleep-Disordered Breathing Among Patients of Community-Based Health Center Clinics in the United States

DLH researchers **Ian Buller**, **Kathryn Konrad**, **Dayna Neo**, and **Braxton Jackson** were among the authors of an [article](#) published in *Sleep Medicine* (Epub: April 2026; Online: August 2026). The authors investigated associations between community-level environmental, social, and health burdens in relation to sleep-disordered breathing (SDB) prevalence and evaluated effect modification by age, sex, race, and ethnicity. A cross-sectional study was conducted using electronic health records from 1,406,727 patients (median age: 44.0 years; 40.3% men) at U.S. community-based health centers in 2022. Patients' residential addresses in 2022 were linked to a census tract-level environmental,

social, and health burden (ESHB) index that reflects community socioeconomic, environmental, and health burden. SDB was identified using diagnostic and procedural codes and categorized as obstructive sleep apnea (OSA), central sleep apnea (CSA), other/unspecified sleep apnea (OUSA), multiple sleep apneas, or procedure-based cases. Higher overall census tract-level environmental, social, and health burden, as measured by the ESHB index, was associated with higher SDB prevalence, with variation by sociodemographic group. Specifically, stronger ESHB-OSA associations were observed among younger adults aged 18–49 years, women, American Indian/Alaska Native, and non-Hispanic patients. Although prospective studies are warranted, the authors' findings illuminate the potential for community-level factors to inform SDB interventions. *The other authors include researchers from the National Institute of Environmental Health Sciences and the National Institute on Minority Health and Health Disparities.*

Diabetes in Older Adults

DLH senior epidemiologist and researcher **Sarah Casagrande** served as an editor for an [article](#) published in *Diabetes in America*, a National Institute of Diabetes and Digestive and Kidney Diseases compilation and assessment of epidemiologic, public health, clinical research, and clinical trial data focused on diabetes, its complications and treatment, health care utilization, and diabetes prevention in the United States. (Online: May 2026). *Excerpt:* Meeting the care needs of older adults (age ≥65 years) living with diabetes is a significant and growing public health challenge in the United States. The steady growth of this population is due to the aging of the U.S. population coupled with a high prevalence of diabetes. In 2023, the prevalence of diabetes was 20.5% for adults age ≥65 years, and nearly half (47%) of adults living with diabetes were in this age group. Comorbidities that can result from diabetes are also prevalent among older adults and include heart disease, stroke, and kidney disease. Geriatric syndromes, such as cognitive impairment, falls, urinary incontinence, frailty and sarcopenia, disability, sensory impairment, polypharmacy, social isolation, and loneliness are present in many older adults with diabetes as well. As a result, the older adult population with diabetes exhibits great heterogeneity in duration of diabetes, complications, comorbidity profiles, and geriatric syndromes. The clinical appreciation of this heterogeneity has led to the development of classification approaches and specialized diabetes care guidelines to individually tailor diabetes care, drug selection, and treatment goals. The evidence for lifestyle (diet and exercise) and pharmacologic interventions for preventing and managing diabetes in older adults has expanded dramatically over the past three decades. New glucose-lowering medications, such as glucagon-like peptide-1 receptor agonists (GLP-1 RAs), dual GLP-1/glucose-dependent insulinotropic polypeptide receptor agonists (GLP-1/GIP RAs) and sodium-glucose cotransporter-2 (SGLT2) inhibitors, have transformed diabetes management for older adults. Diabetes technologies, such as continuous glucose monitoring devices, can be a valuable tool to promote safety for older adults with diabetes who use insulin. The costs of diabetes care in older adults continue to grow, due to an expanding population, high rates of obesity, rising drug prices, and the availability of new, more expensive drugs. In 2022, the direct medical costs of diabetes care for older adults were estimated to be \$205 billion per year. New policies, such as the Inflation Reduction Act which permits Medicare to negotiate drug prices, may help to ensure access to newer glucose-lowering drugs for older adults in the United States. Fundamentally, innovative approaches to both preventing and managing diabetes in older adults are desperately needed to ensure a more sustainable future.

Satisfaction With Life in Relation to Sleep Health Among a Nationally Representative Sample of U.S. Adults

DLH researchers **Christopher Payne** and **Braxton Jackson** were among the authors of an [article](#) published in *Scientific Reports* (Online: May 2026). To investigate associations between life satisfaction and sleep health among adults in the United States, the authors analyzed cross-sectional, nationally representative data from the 2022 National Health Interview Survey. Life satisfaction was dichotomized as “very satisfied/satisfied” versus “dissatisfied/very dissatisfied.” Sleep duration was defined as “recommended” versus “short” (≥ 7 vs. < 7 h), infrequent insomnia symptoms as difficulty falling/staying asleep: “yes” [never/some days for both] vs. “no” [most days/every day to either], and restorative sleep as feeling well rested in the past 30 days: “yes” [most days/every day] vs. “no” [never/some days]. The authors estimated prevalence ratios (aPR) and 95% confidence intervals (CI) overall and by age, sex, race, and ethnicity to test for effect modification. Among 25,090 adults (mean age of 48.1 ± 0.17 years; 54% women), 96.0% reported life satisfaction with comparable prevalence across age (18–30 years [96.6%], 31–49 years [96.4%], and ≥ 50 years [95.0%]) and among men [95.6%] along with women [95.6%]. Prevalence by race and ethnicity ranged from 93.9% [non-Hispanic (NH)–multiracial/other] to 98.0% [NH–Asian]. Life satisfaction versus dissatisfaction was associated with recommended sleep duration, infrequent insomnia symptoms, and restorative sleep even after further adjustment. Age, sex, race, and ethnicity did not modify associations between life satisfaction and sleep. Life satisfaction was associated with recommended sleep duration, infrequent insomnia symptoms, and restorative sleep. Pathways underlying the life satisfaction–sleep relationship should be identified to inform interventions. *The other authors are researchers from the Epidemiology Branch of the National Institute of Environmental Health Sciences.*

Incorporating Geospatial Environmental Exposure Indicators in Individual Hypertension Risk Prediction: A Multi-Stage Machine Learning Pipeline

DLH researcher **Kaitlyn Lawrence** was among the authors of an [article](#) published in the *Journal of Exposure Science & Environmental Epidemiology* (Online Ahead of Print: May 2026). Environmental exposures are known contributors to chronic disease but are rarely incorporated into risk prediction models. The authors demonstrated a staged machine-learning approach to incorporating geospatially measured neighborhood social and ambient environmental exposure measures into hypertension risk prediction. Data from 10,491 adults in the Gulf Long-Term Follow-Up (GuLF) Study Methods were analyzed. Hypertension was defined by measured blood pressure and medication use. The authors assessed incremental predictive performance across three stages: Stage 1 (age, sex, race, BMI); Stage 2 (Stage 1 + neighborhood social factors); Stage 3 (Stage 2 + ambient exposures). Variable selection combined Boruta and bootstrapped area under the precision-recall curve (AUPRC). Logistic Regression, Random Forest, and Extreme Gradient Boosting (XGB) were trained and evaluated for discrimination, calibration, and classification. SHAP (Shapley Additive Explanations) was used to interpret variable contributions. Participants had a mean age of 43.6 years with a standard deviation of 13.02 years; 78.4% were male, 52.3% were non-Hispanic White, and 35.5% had hypertension. Model-selected environmental predictors included neighborhood disadvantage, community resilience, social vulnerability (Stage 2), vegetation, $PM_{2.5}$, NO_2 , and formaldehyde (Stage 3). SHAP identified vegetation, social vulnerability, area deprivation, $PM_{2.5}$, formaldehyde, and community resilience scores as leading environmental contributors. *Impact:* Environmental exposures have been linked to an increased risk of hypertension but have rarely been incorporated into risk prediction models. Leveraging data from a large prospective cohort, the authors developed an interpretable machine

learning pipeline that screens and incorporates relevant geospatial socioeconomic and environmental exposures to individual-level risk prediction models. While adding these selected exposures provided modest improvements in model sensitivity, improved sensitivity identified additional hypertension cases that would have been missed. Even small gains in sensitivity can translate to earlier identification of additional at-risk individuals who might benefit from interventions, which can lead to public health improvements. *The other authors include researchers from the National Institute on Aging, the Medical Research Scholars Program (NIH), and the National Institute of Environmental Health Sciences.*

Neighborhood Disadvantage and Breast Cancer Among Women Living in the United States

DLH researcher **Kaitlyn Lawrence** was among the authors of an [article](#) published in *Cancer Epidemiology, Biomarkers & Prevention* (Online Ahead of Print: May 2026; Print: June 2026). Few large studies have investigated neighborhood socioeconomic position (nSEP) and breast cancer incidence. The authors evaluated the relationship between neighborhood disadvantage and incident female breast cancer in a U.S.-based cohort. The Sister Study (N = 50,884) is a prospective study of environmental and genetic risk factors for breast cancer. The authors linked geocoded residential addresses (2003–2009) to the Area Deprivation Index (ADI; 2000; census-block group), a measure of neighborhood disadvantage in which higher scores represent greater disadvantage. Cox proportional hazard models estimated hazard ratios (HR) and 95% confidence intervals (CI) for the association between ADI and breast cancer, adjusting for individual SEP, lifestyle, and hormonal factors. Breast cancer hazards were evaluated overall (N = 46,993; 4,279 cases) and by estrogen receptor (ER) (ER positive and ER negative) and menopausal (pre- and postmenopausal) status. Stratified analyses explored effect modification by race/ethnicity within each cancer subtype. The authors observed no associations between ADI and overall breast cancer in the full cohort or in race/ethnicity-stratified analyses. The highest versus lowest ADI quartile was associated with lower ER-positive breast cancer, but the HR was above 1.0 for ER-negative breast cancer: 1.18 (95% CI, 0.84–1.65; p = 0.024). The positive HR for ADI Q4 versus Q1 for ER-negative breast cancer was most apparent among non-Hispanic Black women, though results were not statistically significant. *Conclusions:* nSEP was not associated with breast cancer overall, but associations with higher disadvantage varied with ER status. *Impact:* Neighborhood-level socioeconomic context may differentially influence breast cancer risk by tumor subtype. *The other authors are researchers from the Epidemiology Branch of the National Institute of Environmental Health Sciences.*

Revisiting the Modifiable Areal Unit Problem in the Era of Exposome-Wide Association Studies: Assessing the Performance of the CDC/ATSDR Social Vulnerability Index at Privacy-Protecting Spatial Scales

DLH researchers **Jonathan Lewis**, **Nathaniel MacNell**, **Ian Buller**, and **Gary Larson** were among the authors of an [article](#) published in *Environmental Research* (Epub: May 2026; Online: September 2026). The article explores how researchers can identify disease risk factors while protecting participants' privacy. This issue arises because exposome-wide association studies (ExWAS) that use public-domain data sources like measures of social vulnerability may be sensitive to the geographic scale of exposure variables. While linking de-identified geomarkers to participant locations facilitates data sharing and improves privacy protection, the spatial scale and boundaries of geographic units used for analyses may yield varying estimates of epidemiologic associations. The

authors quantified the impact of the modifiable areal unit problem in the context of ExWAS designs via a simulation study and case study approach. They replicated the CDC/ATSDR Social Vulnerability Index (SVI), including its n=16 components and n=4 themes across North Carolina census tracts, county subdivisions, five-digit ZIP Code Tabulation Areas (ZCTA5), counties, and three-digit ZIP Code Tabulation Areas (ZCTA3). The authors investigated exposure-phenotype relationships between SVI indicators and 11 disease outcomes reported by participants in the Personalized Environment and Genes Study (PEGS) cohort. With increased spatial aggregation encompassing larger administrative areas, the exposure distribution became less Gaussian, and there was less evidence of spatial clustering. Additionally, with coarser spatial aggregation, models lost precision: empirical coverage decreased, model estimates were more biased, and power decreased. In a case study of PEGS participants, 20 significant associations were found in exposure-phenotype relationships at the census-tract level. Fifteen were found at the ZCTA5 level and 12 at the ZCTA3 level. The efficacy of a simulated ExWAS to detect robust associations was diminished when using more coarsely aggregated geomarkers. SVI indicators became less informative when aggregated at spatially larger administrative units. *Conclusion:* The results emphasize the importance of using data at spatial resolutions that align with hypothesized exposure-phenotype mechanisms and of anticipating the potential loss of epidemiologic efficacy when participant data must be aggregated to large spatial scales to protect privacy. *The other authors are researchers from the National Institute of Environmental Health Sciences.*

Liver and Gallbladder Disease in Persons With Diabetes

DLH senior epidemiologist and researcher **Sarah Casagrande** served as an editor, and DLH researcher **Constance Ruhl** was a co-author, for an [article](#) published in *Diabetes in America*, a National Institute of Diabetes and Digestive and Kidney Diseases compilation and assessment of epidemiologic, public health, clinical research, and clinical trial data focused on diabetes, its complications and treatment, health care utilization, and diabetes prevention in the United States. (Online: June 2026). *Excerpt:* The associations between diabetes and common chronic diseases of the liver and gallbladder, including metabolic dysfunction-associated steatotic liver disease (MASLD), viral hepatitis, cirrhosis, and gallstone disease, are changing over time. The authors report new analyses on the relationship of these conditions nationally using the National Health and Nutrition Examination Survey (NHANES), Centers for Medicare and Medicaid Services Medicare and Medicaid data, and the Scientific Registry of Transplant Recipients. This article provides a comprehensive and contemporary review of the current state of diabetes as it relates to liver and gallbladder disease in the United States. In a nationally representative sample of the U.S. population in which diabetes was defined based on diagnosis, glycated hemoglobin (A1C), and fasting plasma glucose, the prevalence of MASLD assessed by transient elastography was greater among persons with diagnosed diabetes (55.7%), undiagnosed diabetes (59.2%), and prediabetes (29.1%) compared to those with normal glycemia (15.5%). The MASLD prevalence among persons with diagnosed and undiagnosed diabetes was over twice as high as the general population MASLD prevalence (25.5%). The proportion of individuals with liver elastography-detected MASLD in the NHANES was much higher than documented MASLD diagnoses derived from claims data, which shows that most people with MASLD are likely undiagnosed. Diabetes and insulin resistance are thought to be closely linked to the development and progression of MASLD, which comprises the liver manifestation of a broader multisystem condition with an underlying etiology of insulin resistance that also includes obesity, diabetes, hyperlipidemia, and hypertension. As the obesity epidemic persists and the

diagnosis and treatment of hepatitis B and C have improved, obesity-related liver disease accounts for a growing share of liver disease in the United States. As a result, diabetes is an increasingly important comorbidity requiring consideration and comanagement. *Dr. Ruhl's co-authors are researchers from Baylor College of Medicine and the National Institute of Diabetes and Digestive and Kidney Diseases.*

Toll-Like Receptor 5 Protects Against Murine Lung Fibrosis Through Reduced Dysbiosis, and TLR5 Deficiency Is Associated With Human IPF

DLH researcher **John McGrath** was among the authors of an [article](#) published in *Science Translational Medicine* (Epub and Online: June 2026). Idiopathic pulmonary fibrosis (IPF) is a devastating pulmonary disease with no curative treatment other than lung transplantation that results from maladaptive responses to lung epithelial injury; however, the underlying mechanisms remain unclear, and treatment options are limited. The authors showed that deficiency in the innate immune receptor toll-like receptor 5 (TLR5) is associated with IPF in humans and with increased susceptibility to bleomycin-induced pulmonary fibrosis in mice and that activation of lung epithelial TLR5 through a synthetic flagellin analog protected mice from experimental fibrosis. Mechanistically, epithelial TLR5 activation induced antimicrobial gene expression and ameliorated lung dysbiosis after injury. In contrast, TLR5 deficiency in mice and patients with IPF was associated with lung dysbiosis. Elimination of the microbiome in mice through administration of antibiotics abolished the protective effect of TLR5, and reconstitution of the microbiome by fecal microbiota transplantation rescued the observed phenotype. In conclusion, these studies revealed that TLR5 protects against pulmonary fibrosis through effects on the lung microbiota, providing insight into therapeutic approaches that may ultimately benefit patients with IPF. *The other authors include researchers from the National Institute of Environmental Health Sciences, University of Michigan Medical School, and the Division of Pulmonary, Critical Care, and Sleep Medicine at New York University Grossman School of Medicine.*

Trends in Pregestational and Gestational Diabetes Mellitus and Associations With Severe Maternal Morbidity in U.S. Delivery Hospitalizations, 2016–2022

DLH researchers **Chyng-Wen Fwu** and **Sarah Casagrande** were among the authors of an [article](#) published in *Diabetes Care* (Online Head of Print: June 2026). The authors' objectives were to describe trends in the prevalence of gestational diabetes mellitus (GDM), pregestational diabetes mellitus (type 1 and type 2), and severe maternal morbidity (SMM) in the U.S., and to examine associations between diabetes status and type with SMM. This retrospective study used 2016–2022 data from the Healthcare Cost and Utilization Project National Inpatient Sample. Delivery hospitalizations among women ages 12–55 years were identified. Among 25,138,817 delivery hospitalizations, the prevalence of GDM increased from 7.1 to 9.5 per 100 deliveries, pregestational diabetes mellitus type 2 increased from 0.8 to 1.1 per 100 deliveries, and pregestational diabetes mellitus type 1 remained stable at 0.3 per 100 deliveries from 2016 to 2022. Overall SMM increased from 160.0 to 220.3 per 10,000 deliveries; nontransfusion SMM increased from 72.0 to 93.0 per 10,000 deliveries. In sociodemographic-adjusted models, compared with women without diabetes, type 1 diabetes was associated with the highest risk of nontransfusion SMM, followed by type 2 diabetes and GDM. Conclusions: From 2016 to 2022, GDM and pregestational diabetes mellitus type 2 rose in parallel with increasing SMM. While GDM was the most prevalent, pregestational diabetes mellitus, particularly type 1, was associated with a higher risk of SMM. The increased risk for SMM associated with all forms of diabetes in pregnancy highlights the importance of cardiometabolic risk

management and the need for comprehensive, multidisciplinary care during pregnancy and delivery. *The third co-author is a researcher from the National Institute of Diabetes and Digestive and Kidney Diseases.*

Immune System Evaluation of Echinacea Purpurea Root Extract in Female Harlan Sprague Dawley (Hsd:Sprague Dawley SD) Rats

DLH researcher **Angela Jeffers** was among the authors of an [article](#) published in *Food and Chemical Toxicology* (Epub: June 2026; Online: September 2026). Echinacea is commonly used as a dietary supplement owing to its putative anti-inflammatory, antiviral, and antibacterial activities. Unfortunately, determining risk posed to human health is challenging. A novel combination of chemical and biological characterization was employed for selection of a representative extract sample used for in vivo investigation of the immunomodulatory properties of Echinacea (E.) purpurea. In vitro cytokine profiling showed the extract could stimulate pro-inflammatory cytokine production in the absence of detectable endotoxin. An in-depth in vivo evaluation of the immune response following a 28-day oral exposure to the selected E. purpurea extract was conducted in adult Harlan Sprague Dawley (HSD) female rats at doses up to 2000 mg/kg/day. There was no evidence that E. purpurea caused overt toxicity or effects on humoral immunity. However, cell-mediated immunity was increased but only at low doses and with no evidence of a dose-response. In addition, E. purpurea treatment enhanced natural killer cell activity and the relative percentage of macrophages/monocytes in the spleen of rats from the highest treatment group. These results suggest that E. purpurea may have immunomodulatory properties that support antiviral and antibacterial activity but may also foster an immunostimulatory environment that could exacerbate some immune-mediated conditions. *The other authors include researchers from the National Institute of Environmental Health Sciences.*

