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A Message from Dr. Dale Sandler, Principal Investigator



Dale P. Sandler, Ph.D.
GuLF STUDY
Principal Investigator

Dear Study Participant,

We hope you and your family are well despite the challenges of these past few years. The GuLF STUDY team has completed a lot of work since we last contacted you. We would first like to thank you for completing our second follow-up questionnaire! Your responses will allow our team to learn more about the short- and long-term effects of the oil spill on those who participated in the cleanup effort. In addition to completing the second follow-up of the cohort, we've been busy analyzing the questionnaire information you provided at enrollment and first follow-up. We've also added new members to our study team.

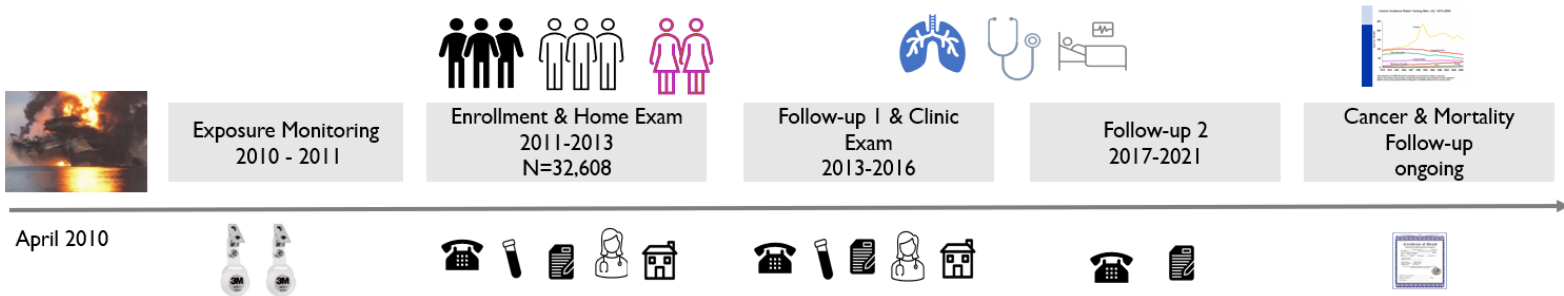
In this newsletter, we share updates on the research we've been doing, including summaries of some recent findings and a brief description of our ground-breaking exposure assessment effort. The newsletter also includes a recap of the study design and timeline.

If you would like to learn more about the study, please scan the QR code to visit our study website (gulfstudy.nih.gov) or call 1-855-NIH-GULF (1-855-644-4853)



Study Updates and Recap

Since our last newsletter we published over 25 scientific papers from the study. Links to these articles can be found on our website under the *Publications* tab. Our team has also met with community groups and organizations interested in the effects of oil spills and presented results at scientific meetings. Recently, Dr. Kaitlyn Lawrence, who has been working on the study as a postdoctoral fellow has become a lead investigator as GuLF STUDY "Staff Scientist", replacing Dr. Richard Kwok who now works in the Office of the Director at NIEHS. We now support the projects of at least ten graduate students, including some at universities in the Gulf States. These students are using GuLF STUDY data to study potential health risks. All of this is possible thanks to your continued support and participation in each phase of the study.

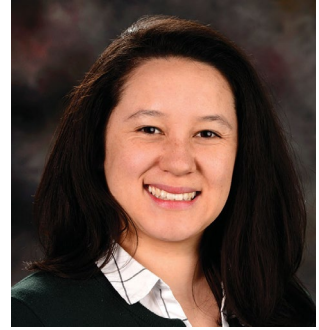


The picture here shows the **GuLF STUDY timeline**. Following the 2010 *Deepwater Horizon* disaster, levels of oil spill chemicals were monitored during the cleanup (2010-2011) by the responsible party and federal agencies. Starting in early 2011 the GuLF STUDY enrolled over 32,000 adults who participated in the oil spill cleanup and response (workers) or completed safety training but did not work (nonworkers) to study potential health effects. Participants from across the US enrolled in the study by completing telephone interviews. Many of those living in states along the Gulf of Mexico completed home exams that collected biological samples and clinical data. Two follow-up efforts have been completed. Telephone interviews collected updated health histories. Clinical exams with a subset of the cohort collected clinical data, including lung and neurological function measures. Long-term follow-up via linkages with cancer registries and the National Death Index are ongoing.

Recent Research Findings

Asthma more likely among those who did cleanup work compared to nonworkers

Oil spill cleanup workers may have been exposed to a variety of airborne chemicals collectively known as total hydrocarbons (THC) as well as to individual chemicals such as benzene, toluene, ethylbenzene, o-, m-, and p-xylenes and n-hexanes (BTEX-H) that are found in crude oil vapors and in byproducts of burning crude oil. Although some studies have found that cleanup workers are at higher risk of reduced lung function, previous studies have not measured the amount of exposure to these chemicals or the specific chemical components. To address this gap, Dr. Kaitlyn Lawrence and our team analyzed data from the GuLF STUDY and found that workers involved in cleaning up the oil spill were 60% more likely than those who did not work on the cleanup to be diagnosed with asthma or experience asthma symptoms in the three years after the spill. Additionally, she found that the risk of asthma symptoms increased with increasing levels of exposure to individual BTEX-H chemicals as well as the BTEX-H mixture. If you were involved in the cleanup effort and are experiencing wheezing or other asthma-like symptoms, it would be good to let your healthcare providers know that you worked on the oil spill.



Kaitlyn Lawrence, Ph.D.
NIEHS

Lawrence, Kaitlyn G., et al. "Association between airborne crude oil chemicals and symptom-based asthma." *Environment International*, vol. 167, Sep. 2022, doi:10.1016/j.envint.2022.107433.

Hypertension more common among those exposed to oil spill chemicals



Richard Kwok, Ph.D.
NIEHS

Is working on oil spill cleanup associated with high blood pressure? In other settings, individuals exposed to airborne total hydrocarbons (THC) through living in polluted cities, pumping gas, living in communities near oil and gas production facilities, or working in chemical industries have been shown to have an increased risk of high blood pressure compared to those who had low exposure. Dr. Richard Kwok and our team sought to find out if the chemical exposures from the oil spill were similarly associated with the chances of developing hypertension or high blood pressure. We found that working cleanup jobs on land and water were associated with a 31-51% higher risk of being newly diagnosed with high blood pressure in the three years following the spill. Support workers did not have an increased risk compared to those who did not work on the spill. Exposures to higher levels of THC and to burning oil and/or flaring natural gas were also associated with increased risk of high blood pressure. The U.S. Preventive Services Task Force (USPSTF) recommends screening for high blood pressure in adults age 18 or older who don't have known high blood pressure. They also suggest yearly screening for adults age 40 years or older and those who are at increased risk for high blood pressure. Cleanup workers with exposure to chemicals and burning/flaring oil/natural gas may want to talk with their healthcare providers

about when and how often to screen for high blood pressure.

Kwok, Richard K., et al. "Association of Deepwater Horizon Oil Spill Response and Cleanup Work with Risk of Developing Hypertension." *JAMA Network Open*, vol. 5, no. 2, Feb. 2022, doi:10.1001/jamanetworkopen.2022.0108

Other Findings

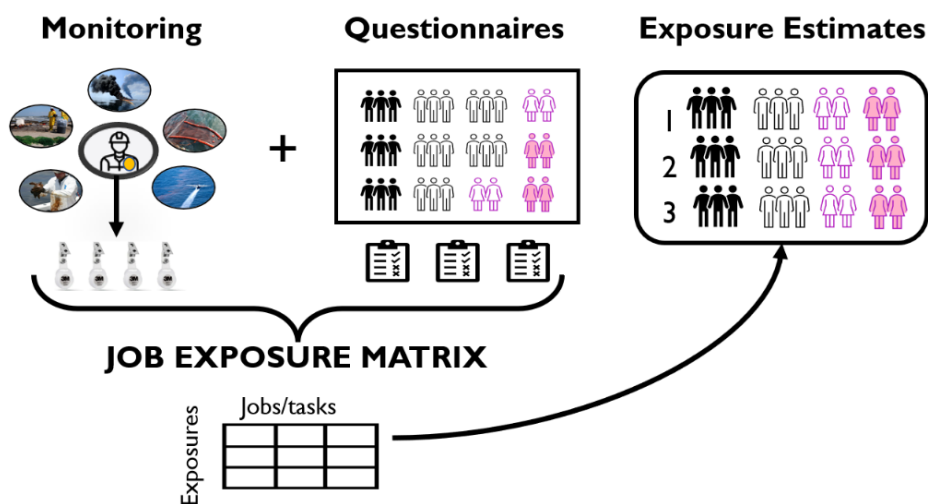
Students working under the mentorship of GuLF STUDY researchers have published other health-related research findings in the past year. Dr. Kenny Chen, who recently received his PhD from the University of North Carolina and is now working as postdoctoral fellow at NIEHS found that among oil spill response and cleanup workers, those exposed to fine particulate matter (PM_{2.5})—a type of air pollution—specifically from controlled burning of oil/gas had reduced lung function compared to workers not involved in burning. Hanna Jardel, a current doctoral student also at the University of North Carolina, observed an exposure-response relationship between maximum daily THC exposure level and the likelihood of being newly diagnosed with diabetes. Other students are currently studying the impact of the oil spill cleanup on mental health, fertility, neurological symptoms, liver function, and sensory/motor function.

Chen, Dazhe, et al. "Fine Particulate Matter and Lung Function among Burning-Exposed Deepwater Horizon Oil Spill Workers" *Environ Health Perspect*, vol. 130, no. 2, Feb. 2022. doi: 10.1289/EHP8930

Jardel, Hanna, et al. "The association between oil spill cleanup-related total hydrocarbon exposure and diabetes" *Environ Res*. Vol 212, Sep. 2022. doi: 10.1016/j.envres.2022.113591 oi:10.1001/jamanetworkopen.2022.0108

New Exposure Assessment Publications

Earlier this year the GuLF STUDY exposure assessment team published a collection of papers describing the work that went into developing chemical exposure estimates for study participants involved in the *Deepwater Horizon* oil spill response and cleanup. This work is the most extensive exposure assessment project ever completed on an oil spill. These papers describe the statistical and methodological foundations of the exposure estimates. The reports include estimates of average exposures to specific oil spill chemicals for a range of oil spill response and cleanup jobs/tasks and describe how these exposures were estimated from the monitoring that was done during the cleanup effort. They described how oil “weathers” over time, losing some of its volatile compounds, and showed that exposures varied with location worked, time (before and after the well was capped), and the specific jobs/tasks performed. The papers also describe how the monitoring data was combined with questionnaire information to develop estimates of exposure to major chemical components of the crude oil as well as to the air pollution produced by the burning/flaring of oil and natural gas for participants in the GuLF STUDY. The research team is now using these new exposure estimates of average and cumulative exposures to study potential health effects associated with overall and specific oil spill chemicals. Of note, we did not have actual chemical monitoring data for participants in our study. The team created what is known as a “job exposure matrix” to link estimated average exposures for specific jobs/tasks to questionnaire reports of activities performed by study participants, as illustrated in the figure below. If you are interested in learning more about this research, you can visit this link: https://academic.oup.com/annweh/issue/66/Supplement_1



Characterizing Exposures of GuLF STUDY Participants

The picture above shows how exposure estimates were assigned to individual participants in the GuLF STUDY. During the cleanup and response, exposures were monitored by the responsible party. Study experts used those data to calculate average exposures for specific jobs/tasks performed throughout the spill at different times and locations. Study participants described what they did during the cleanup in their enrollment interview. Using a **Job Exposure Matrix**, the team could assign exposure estimates to each of the jobs/tasks reported by study participants, allowing us to estimate average daily and cumulative exposures to a range of oil spill chemicals.

COVID-19 in the GuLF STUDY

We are interested in learning more about your experience with COVID-19. Because COVID-19 may have affected your health in many ways, knowing if you had COVID-19 will help us better understand the general health information you have already provided. Please be on the lookout for emails or mailings from the GuLF STUDY regarding a short questionnaire about whether you had or were hospitalized due to COVID-19.