POSTER ABSTRACT SUBMISSIONS

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POSTER ABSTRACT
Project Title: A cloud-hosted software solution to streamline and accelerate end-to-end cancer research workflows

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Poster Abstract:

Innovations in genomics, bioinformatics, pathology, and epidemiology research have proliferated recently, and hold great promise for addressing major healthcare challenges. Maximizing potential for these technologies requires synthesis of large, multimodal data sets, and collaboration between investigators and teams with complementary expertise. However, the workflows required depend upon availability of infrastructure for data management, harmonization, and analysis that many organizations lack funding or expertise to instantiate.

Since the 1950s, the American Cancer Society (ACS) has invested in cohort studies (Cancer Prevention Studies (CPS)) on 100,000s of participants, which have generated a wealth of data that have informed guidelines around factors contributing to cancer risk. Constraints in funding, capacity, and expertise cause ACS to continue using practices for study and data management that lack adoption of modern technologies. To accelerate use of CPS data, ACS partners with Manifold to modernize the software for end-to-end participant and data management. The

developing suite of software solutions, Science Cloud, integrates a Participant Relationship Management (PRM) portal for managing and gathering data from participants in CPS studies; a data catalog and exploration tools to enable researchers to quickly find, aggregate, and explore multimodal CPS data; and a research workbench application with computational environments and research management tools that enable collaboration on CPS data in an ACS-managed environment.

We present the design and implementation of the Science Cloud software for streamlining and accelerating study and data management and collaboration throughout the cancer research process, along with quantified impacts of early adoption of these tools on ACS's processes.

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POSTER ABSTRACT

Project Title: Use of a 24-hour timing grid in the Cancer Prevention Study-3 to assess circadian rhythms

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Poster Abstract:

Background: Several prospective cohort studies have assessed sleep in their populations. However, they are limited to questions on overall sleep duration or utilize clinic-based instruments. As we better understand how sleep and circadian rhythms impact health, newer methods are needed. Here, we present a 24-hour grid-based sleep and diet assessment tool.

Methods: Participants completed a 24-hour grid, with hour-long blocks, to assess weekday and weekend sleeping and eating habits on the 2015 triennial American Cancer Society Cancer

Prevention Study-3 follow-up survey. Circadian patterns obtained from the grid were compared to self-reported categorical assessment of sleep duration(≤4,5-6,7-8,≥9 hours).

Results: Among 180,000 respondents, 65% reported sleeping at least 7-8 hours during weekdays and 85% on weekends, based on the categorical sleep duration question. Based on overnight sleep duration calculated from the 24-hour grid, 86% and 93%, respectively, slept at least 7-8 hours. Napping behavior was more frequent in those that reported ≤4 hours of overnight sleep(20% vs 5%) and they experienced the highest levels of social jetlag(difference in weekend/weekday sleep midpoint(time halfway between bedtime and waketime)) with almost 9% reporting ≥3.5 hour difference.

Discussion: The 24-hour grid estimated similar, but slightly greater, sleep duration as the categorical assessment. The grid enables calculation of sleep midpoint and social jetlag, sleep related constructs that are increasingly associated with health. The grid can identify other circadian patterns, such as fasting and napping, that other sleep questionnaires may not capture, facilitating multidimensional research. Further work is necessary to validate tools to capture circadian behavioral patterns.

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POSTER ABSTRACT

Project Title: Hormone therapy use and young-onset breast cancer: A Premenopausal Breast Cancer Collaborative Group Study

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Poster Abstract:

Estrogen plus progestin combination hormone therapy (EP-HT) use is an established risk factor for breast cancer in older, post-menopausal women. Less is known about hormone use in young women, who may use following gynecological surgery or because of peri-menopausal symptoms. We investigated the relationship between hormone therapies and breast cancer incidence before age 55 by pooling data from 9 prospective cohorts participating in the Premenopausal Breast Cancer Collaborative Group. We used Cox proportional hazards regression with age as the time scale to estimate pooled hazard ratios (HRs) and 95% confidence intervals (CI) for the association of hormone therapy use (ever and type) with incident young-onset breast cancer. Models were stratified by study and adjusted for potential confounders. The sample included 399,744 women, 6,656 (1.7%) of whom developed breast cancer before age 55 (median follow-up=7.5 years). Average age at enrollment was 42.3 years; 16% of non-cases and 13% of cases reported ever using hormone therapy, with EP-HT (8% of non-cases, 6% of cases) more common than unopposed estrogen (E-HT; 6% of non-cases, 4% of cases). There was no clear association between ever HT and young-onset breast cancer (HR=0.94, 95% CI: 0.86-1.02). The EP-HT association was also near null (HR=1.02, 95% CI: 0.92-1.14), but we observed an inverse association between E-HT and young-onset breast cancer (HR=0.84,95% CI: 0.72-0.97). The inverse association between E-HT and young-onset breast cancer is consistent with previous studies of later-onset breast cancer. Our results do not support a strong positive association between EP-HT use and young-onset breast cancer.

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POSTER ABSTRACT

Project Title: Fruits, vegetables, and breast cancer in the Pooling Project of Prospective Studies of Diet and Cancer

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Poster Abstract:

Background. Fruits and vegetables have been associated with reduced risk of breast cancer. Results vary across fruit and vegetable groups and breast cancer subtypes. Few studies have investigated relationships with tumor subtypes defined by estrogen receptor (ER), progesterone receptor (PR), and human epidermal growth factor receptor 2 (HER2) status.

Methods. These preliminary analyses included 22 cohorts in the Pooling Project of Prospective Studies of Diet and Cancer (N=1,245,368). Usual diet for the year before assessment was collected using food frequency questionnaires. For breast cancer outcomes, data on ER and PR status were provided by all studies; 11 studies provided data on HER2 status. Associations were assessed using a 2-stage approach: (1) Cox proportional hazards models to calculate study-specific hazard ratios (HR) and 95% confidence intervals (95%CI) and (2) random effects models to pool risk estimates.

Results. Participants were followed for a median of 15.1 years, and 53,856 total, 7,389 ER-, and 1,422 ER-/PR-/HER2- breast cancer cases were identified. Fruit intake was associated with reduced risk of overall (Q5 vs. Q1 HR=0.94, 95%CI=0.90, 0.98), ER- (Q5 vs. Q1 HR=0.90; 95%CI=0.81, 1.00) and ER-/PR-/HER2- cancer (Q5 vs. Q1 HR=0.82; 95%CI=0.69, 0.97). Vegetable (Q5 vs. Q1 HR=0.86; 95%CI=0.78, 0.95) and cruciferous vegetable intakes (HR per 100 g/d=0.96; 95%CI=0.93, 0.98) were associated with lower risk of ER- and overall breast cancer, respectively. Future analyses will evaluate additional fruit and vegetable groups and breast cancer subtypes.

Conclusion. Fruit and vegetables are associated with lower breast cancer risk, and associations appear to vary by tumor subtype.

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POSTER ABSTRACT

Project Title: No epidemic of cancer in young ages – data from the Nordic population-based cancer registries

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Poster Abstract:

Assessing trends in incidence rates over time requires correct counts of both population and cancer cases. The Nordic countries, with a population of ~27 million people, have had solid population-based cancer registries since the 1950s.

We used NORDCAN, a collaboration between the Nordic cancer registries and IARC, to assess changes in cancer incidence rates in young (aged 15-49) and older individuals (aged 50-85+) from 1990 onwards.

In all adults aged 15 to 85+, there was an increase in age-adjusted incidence rates of all sites of 23.1% in men, 28.3% in women from 1990 to 2019. This increase was 22.2% in young men, 23.2% in older men, and 23.2% in young, and 29.3% in older women. In the age group 15-49 years, the incidence rates were stable in the first decade, with 1.3% increase in men and 1.7% increase in women. After 2000, rates increased with over 20% in both young men and women. Most of this increase took place between 2004-2016 with a trend of decreasing incidence after that. The estimated annual percentage change in incidence rates was about 1% in both young men and women from 2000, while mortality rates declined with about 2.5% per year. In the older age group, incidence trends increased gradually over time.

In conclusion, population-based data from the Nordic countries do not show large increases in cancer rates for men and women aged 15-49, but similar increases to those seen in the older age groups. Mortality rates have declined significantly in both age groups.

AUTHOR'S INFORMATION

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POSTER ABSTRACT

Project Title: Predicting Chemotherapy Response in Colorectal Cancer: A machine learning approach Applied to Gene Expression Data

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Poster Abstract:

Background: FOLFOX and FOLFIRI chemotherapy are considered standard first-line treatment options for colorectal cancer (CRC). However, the criteria for selecting the appropriate treatments have not been thoroughly analyzed. Here, we aim to use machine learning and genetic profiles to identify precise multi-gene panels that can predict the response to 5-Fluorouracil-based chemotherapy in colorectal cancer patients.

Methods: The genetic profiling data, including drug response profiles, were retrieved from the Gene Expression Omnibus (GEO) database. These datasets were used to train and validate machine learning models. Feature selection methods, such as least absolute shrinkage and selection operator (LASSO) and variable selection from random forests (varSelRF) and various algorithms, such as Random Forest and Support Vector Machines, were applied to develop predictive models. Functional enrichment and network analyses were performed using Ingenuity Pathway Analysis (IPA).

Results: This study identified relevant gene signatures at two stages of colorectal cancer: primary and metastasis using two different chemotherapy regimens, FOLFOX and FOLFIRI. The predictive models achieved an average prediction accuracy of 93% in identifying drug response outcomes across multiple chemotherapy regimens. The application of the machine learning model suggested that 28.6% of patients who failed the treatment therapy they received would benefit from the alternative treatment.

Conclusion: The developed machine learning models demonstrate potential for guiding clinicians in selecting the most effective treatment options based on individual genetic profiles. With additional clinical validation, this approach could lead to improvements in treatment outcomes for patients with CRC and other cancers.

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POSTER ABSTRACT

Project Title: Community-Based Participatory Research to Improve Cohort-Based Data Science and Data Sharing

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Poster Abstract:

Background: Managing and sharing cancer epidemiology cohort (CEC) data is challenging, time-consuming, and expensive. Cloud computing and cloud-based data platforms can improve CECs' data management and sharing, but access to the funds, expertise, and resources necessary to adopt cloud strategies is currently unequal. For many free-standing and traditionally NCI-supported CECs, there is no clear roadmap for how to design, test, deploy, or fund a transition from current methods to cloud-based solutions that make CEC data more FAIR (Findable, Accessible, Interoperable, Reusable).

Methods: We propose a community-based participatory research (CBPR) approach to advance data science and improve cloud adoption within the NCI Cohort Consortium community. This work has three goals and will prioritize essential tasks such as data harmonization, data storage, and integration of diverse environmental and molecular data. First, to invite investigators, data managers & analysts, and other CEC study staff to share their views and progress on current data strategies, pain points, and potential future solutions. Second, to develop a consensus plan and timeline for collecting those views, brainstorming, and discussions as a community. Third, to identify pilot, demonstration, or proof-of-concept projects that could directly tackle high-priority areas that emerge from the first two steps.

Results: The specific results and outcomes of this approach would be developed and agreed upon by the community of stakeholders in the NCI Cohort Consortium. Potential outcomes could include plans for a) a series of in-person meetings among stakeholders, b) partnering with other organizations, such as the AACR, to leverage opportunities for stakeholder engagement, c) applying for funding (e.g., grant applications) to support this CBPR approach, d) incorporating these goals into ongoing NCI Cohort Consortium activities, e) short- and long-term funding and sustainability strategies, or f) other novel and promising ideas that emerge during this process.

Discussion: At present there is a major unmet data science need within the NCI Cohort Consortium community. A small number of cohorts have already adopted cloud strategies, but the types of funding that supported those early adopters are less available today than in previous years. A small number of national-scale cohorts, with budgets that are orders of magnitude larger than what a typical CEC has access to, are building cloud platforms from scratch, but the potential reusability or feasibility of using those platforms in other CECs is unclear. A small number of CECs are using private or institutional funds to adopt cloud computing and data platforms, but many CECs do not have access to those types of funding sources. We welcome interested investigators and CEC teams to join this inclusive CBPR effort and work together as a community to identify and pursue practical steps CECs can take to improve data science and data sharing for all NCI Cohort Consortium stakeholders.

LIGHTNING TALK SUBMISSIONS

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LIGHTNING TALK ABSTRACT

Project Title: Hormone therapy use and young-onset breast cancer: A Premenopausal Breast Cancer Collaborative Group Study

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Lightning Talk Abstract:

Estrogen plus progestin combination hormone therapy (EP-HT) use is an established risk factor for breast cancer in older, post-menopausal women. Less is known about hormone use in young

women, who may use following gynecological surgery or because of peri-menopausal symptoms. We investigated the relationship between hormone therapies and breast cancer incidence before age 55 by pooling data from 9 prospective cohorts participating in the Premenopausal Breast Cancer Collaborative Group. We used Cox proportional hazards regression with age as the time scale to estimate pooled hazard ratios (HRs) and 95% confidence intervals (CI) for the association of hormone therapy use (ever and type) with incident young-onset breast cancer. Models were stratified by study and adjusted for potential confounders. The sample included 399,744 women, 6,656 (1.7%) of whom developed breast cancer before age 55 (median follow-up=7.5 years). Average age at enrollment was 42.3 years; 16% of non-cases and 13% of cases reported ever using hormone therapy, with EP-HT (8% of non-cases, 6% of cases) more common than unopposed estrogen (E-HT; 6% of non-cases, 4% of cases). There was no clear association between ever HT and young-onset breast cancer (HR=0.94, 95% CI: 0.86-1.02). The EP-HT association was also near null (HR=1.02, 95% CI: 0.92-1.14), but we observed an inverse association between E-HT and young-onset breast cancer (HR=0.84,95% CI: 0.72-0.97). The inverse association between E-HT and young-onset breast cancer is consistent with previous studies of later-onset breast cancer. Our results do not support a strong positive association between EP-HT use and young-onset breast cancer.

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LIGHTNING TALK ABSTRACT

Project Title: A New Cohort Community Resource: The Viz of the Month

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Lightning Talk Abstract:

Background: Data visualizations ("vizzes") are transforming how we understand, manage, and use data. There are endless possibilities of how to visualize the millions of data points collected in cohort studies, but getting started with data visualization can be daunting. Many general resources exist for creating vizzes, but we wanted to create a free and FAIR (Findable, Accessible, Interoperable, Reusable) resource specifically designed to help the cohort community make relevant visualizations with their data.

Methods: In January 2023 the California Teachers Study (CTS) launched our “Viz of the Month” blog series. Each month the CTS uses R to create a new viz highlighting an interesting facet of

cohort data. We designed the viz, an explanation of the viz, and the code used to produce the viz to be self-explanatory and easy for other cohorts to use with their own data.

Results: Three contributors—two CTS team members and one collaborating researcher—have designed eight monthly vizzes on topics such as stage at diagnosis by cancer type, population density by county at study baseline, questionnaire response patterns over follow-up, and COVID diagnoses in the cohort. All materials are on the CTS website (calteachersstudy.org/blog) and CTS GitHub repository (California-Teachers-Study).

Conclusion: The CTS Viz of the Month makes visualizations and the underlying code publicly available. Anyone can use this CTS resource to replicate a viz using their own cohort data.

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LIGHTNING TALK ABSTRACT

Project Title: Mental Health and Social Connection among Older Lesbian and Bisexual Women

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Lightning Talk Abstract:

OBJECTIVES: Although published literature on mental health and other health-related issues experienced by sexual and gender minority individuals continues to grow, data specific to older women are limited. The purpose of the study is to assess differences in mental health measures between older lesbian and bisexual women compared to heterosexual women.

METHODS: Using data from the California Teachers Study, we conducted cross-sectional analyses and used logistic regression modeling to estimate odds ratios (OR) and 95% confidence intervals (CI) comparing lesbian and bisexual women aged 50 years and older separately to heterosexual women in relation to social connection, overall happiness, and diagnosed depression.

RESULTS: After controlling for age and marital status, older bisexual women were significantly more likely to report lack of companionship (OR=2.00; 95% CI, 1.30-3.12) and feeling left out (OR=2.33; 95% CI, 1.36-3.97) compared to older heterosexual women. The odds of reporting feeling isolated from others was significantly higher in lesbian (OR=1.56; 95% CI, 1.06-2.30) and bisexual women (OR=2.30; 95% CI, 1.37-3.87) than in heterosexual women. The OR (95% CI) for reporting not being very happy overall was 1.96 (CI, 1.09-3.52) in bisexual women and 1.40 (0.92-2.14) in lesbian women compared to heterosexual women. The likelihood of reporting diagnosed depression was significantly higher in lesbian women (OR=1.65; 95% CI, 1.38-1.97) and bisexual women (OR=2.21; 95% CI, 1.67-2.93) compared to heterosexual women.

CONCLUSION: Inclusion of lesbian and bisexual women in aging research is essential to understand their unique mental and other health needs, including those that are cancer-related.