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Psychotropic Medication Use Before Cancer Diagnosis Among US Adolescents and Young Adults†

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OBJECTIVES/GOALS: To describe the prevalence of, and factors associated with, psychotropic medication use before cancer diagnosis (solid tumor cancer, lymphoma or leukemia) among AYAs 15 to 39 years of age in the US. METHODS/STUDY POPULATION: Retrospective cohort study in a 10% sample of claims from the IQVIA PharMetricsÂ® Plus for Academics (2006-2020). We included AYAs with no prior cancer diagnosis codes 9 months before their index date – defined as the first of â‰¥2 ICD-9/10-CM primary diagnosis codes for cancer occurring â‰¤60 days apart. We defined psychotropic use as a claim for an antidepressant, anxiolytic/sedative-hypnotic, mood stabilizer, stimulant or antipsychotic medication. Prevalence of psychotropic use overall and by class, was estimated as the proportion of AYAs with at least one claim for a psychotropic in the 9-months prior to the index date. Using Chi-square and T-tests, we compared demographic characteristics, prevalence of mental health disorders, chronic pain and cancer type between psychotropic users and non-users. RESULTS/ANTICIPATED RESULTS: We identified 6,257 AYAs with cancer (thyroid 17%, breast 13%, melanoma 13%), 64% female, mean age 31 (SD 6) years. Twenty-four percent (n=1,506) used a psychotropic in the 9 months prior to the index date. Psychotropic classes used were antidepressants 15%, anxiolytic/sedative-hypnotics 11%, stimulants 3%, mood stabilizers 2% and antipsychotics 1%. Psychotropic use was higher among females than males (27% vs 19%, p <.001), older than younger AYAs (35 to 39 years-old: 26% vs 15 to 19 years-old: 16%, p <.001). Anxiety (25% vs 4%), depression (22% vs 3%) and chronic pain (17% vs 8%) were more common among those with psychotropic use pre-cancer diagnosis (all p <.001). The proportion of AYAs diagnosed with brain cancer was higher among psychotropic users than non-users (7% vs 5%, p <.001). DISCUSSION/SIGNIFICANCE: One in four US AYAs used a psychotropic medication prior to being diagnosed with cancer. Understanding psychotropic medication management patterns for these patients before cancer treatment may help inform comprehensive care.

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Analysiss of TNBC Cell Lines Cultured a Novel Translational Breast Cancer Microphysiological System (BC-MPS)*

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OBJECTIVES/GOALS: Current approaches to drug development for the aggressive triple negative breast cancer rely on current 2D and 3D in vitro models which have limited capabilities. We have developed a translational microphysiological system that can maintain the human breast microenvironment to capture the complex interaction with the tumor microenvironment. METHODS/STUDY POPULATION: Three different TNBC cell lines were seeded in BC-MPS: MDA-MB-231 parental cell line, MDA-MB-231wiht the gene, LKB1 overexpressed, which is a tumor suppressor, and MDA-MB-231 with the enzyme, ERK5, an enzyme associated with increased metastasis and drug resistance, knocked out. These three TNBC cell lines were cultured in a standard 2D 96-well plate and in BC-MPS. Time-lapse videos were taken to track cellular mobility. RNA-sequencing was performed to compare different expression levels of various cancer related genes of the cell lines cultured in standard 2D and BC-MPS. RESULTS/ANTICIPATED RESULTS: The LKB1 overexpressed MDA-MB-231 and the ERK5-ko MDA-MB-231 cell lines are expected to have decreased mobility compared to the parental cells. The cell lines are expected to have increased expression of cancer related genes when cultured in BC-MPS than when cultured in standard 2D due to the presence of human breast tissue. DISCUSSION/SIGNIFICANCE: BC-MPS is a promising new translational MPS that facilitates studying long term interactions between real human breast tissue and cancer cells. The BC-MPS systems ability to support the growth of established cell lines has been demonstrated. Future studies will focus on developing the model for personalized medicine.

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Optimizing Haploidentical Donor Selection for Pediatric Hematopoietic Cell Transplant

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OBJECTIVES/GOALS: Patients who require a hematopoietic cell transplant (HCT) and dont have an HLA-matched related or unrelated donor may rely on a haploidentical donor. The optimal haploidentical donor and guidance for selection is limited. We aim to determine how donor characteristics affect outcomes following haploidentical-HCT for pediatric patients. METHODS/STUDY POPULATION: This is a retrospective cohort study evaluating the effect of donor age and relationship on post-HCT outcomes in children (0-18y) from 2008-2018. Multivariable logistic regression analysis will identify if donor age or donor relationship affect the development of graft-versus-host-disease (GVHD), while adjusting for other patient, donor, and transplant related variables. Two-year overall survival & event-free survival will be determined using Kaplan-Meier curves, stratified by donor age group and donor relationship, and compared by log-rank testing. Sub-analyses will be performed for myeloablative transplants and reduced intensity conditioning, as well as for malignant and non-malignant diseases. RESULTS/ANTICIPATED RESULTS: Our primary aim to is determine the effect of donor age and the effect of donor relationship to patient on the development of GVHD. We hypothesize that utilization of a younger donor will decrease the incidence of GVHD. Further, we hypothesize that utilizing a sibling haploidentical donor will result in less GVHD than a parental donor. Secondary aims include evaluating the effect of donor age and donor relationship on overall survival, event-free survival, non-relapse mortality, relapse, graft failure and time to engraftment. The results of this study will help us to develop criteria for optimal haploidentical donor selection. If donor selection is optimized, this could result in improved outcomes following haploidentical transplants. DISCUSSION/SIGNIFICANCE: Haploidentical donors are increasingly used as many patients, especially ethnic minorities, do not have

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an HLA-matched donor. This will be the largest study of haploidentical HCT in children. The data gathered will allow us to identify important donor characteristics to help guide physician decision-making when choosing a haploidentical donor.

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Studies of epilepsy surgery outcomes are statistically underpowered.

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OBJECTIVES/GOALS: Low statistical power is a problem is many fields. We performed a systematic review to determine the median statistical power of studies of epilepsy surgery outcomes. METHODS/STUDY POPULATION: We performed a PubMed search for studies reporting epilepsy surgery outcomes for the years 1980-2000, focusing on studies using stereo-electroencephalography (SEEG). We extracted patient count data for comparisons of surgical outcome between groups, based on a prognostic factor. We defined a clinically meaningful difference the surgical outcome for MRI positive (66.9%) compared to MRI negative (45.5%) in the largest study in the series. The statistical power of a Chi-square test was computed as the percentage of simulated runs (10,000 repetitions) assuming this difference with a p-value less than 0.05. RESULTS/ANTICIPATED RESULTS: Based on 69 studies, the median sample size was 38 patients, and the median statistical power was 24%. This implies at least a 17% (0.5/[0.24+0.05)) chance a study with a significant result in false, assuming 1:1 pre-test odds. A 'typical' SEEG study with 33 patients and 2:1 allocation had a median significant odds ratio of 6.5, which over-estimates the true odds ratio of 2.4. DISCUSSION/SIGNIFICANCE: Studies of epilepsy surgery outcomes using SEEG are statistically underpowered. This means true effects will be missed, the chance a study with a significant result is false will be inflated, and significant effects found will be over-estimated. Studies of surgery outcome need better statistical rigor if they are to reliably guide treatment.

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The association between quitting electronic cigarette use in pregnancy and the risk of preterm birth and low birth weight†

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OBJECTIVES/GOALS: Nearly half of mothers who report electronic (e)-cigarette use during pregnancy believe e-cigarettes are less harmful than traditional cigarettes. We aim to determine the association of quitting e-cigarette use in pregnancy with the risk of preterm birth and low birth weight. METHODS/STUDY POPULATION: We conducted a cross-sectional study of women participating in the Pregnancy Risk Assessment Monitoring System and with live singleton birth during 2016-2019. Women were classified based on their e-cigarette use: before pregnancy only (quitters), last three months of pregnancy only (initiators), at both times (sustained users), and neither time (non-users). We used a modified Poisson regression to determine the association between quitting e-cigarette use and preterm birth (<37 weeks) and low birth weight (<2,500 grams) adjusting for demographic, social-economic, and behavior-related risk factors. Analyses were weighted to account for the survey design and non-response. RESULTS/ANTICIPATED RESULTS: Based on 150,950 women who responded to the survey, there were estimated 2.9% quitters, 0.2% initiators, 1.0% sustained users, and 95.9% non-users in the U.S. Compared to sustained e-cigarette users, quitters had a similar risk in preterm birth (adjusted risk ratio [ARR]: 0.84, 95% confidence interval [CI]: 0.65, 1.08) and a significantly reduced risk in low birth weight (ARR: 0.77, 95%CI: 0.61, 0.97) adjusting for traditional cigarette use, age, race/ethnicity, education, marital status, family income, prior preterm birth, prior live births, BMI prior to pregnancy, pregnancy weight gain, kotelchuck index, multivitamin use, drinking prior to pregnancy, year of birth, and residential state. DISCUSSION/SIGNIFICANCE: As FDA authorizes the sales of certain e-cigarettes, women smokers may switch to e-cigarettes, believing they are reducing harm. Our study shows that quitting e-cigarette use is associated with a reduction of low birth weight. Clear messaging is needed to help women cease e-cigarette use in pregnancy.

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Neurologic complications in children with seizures and respiratory illness: A comparison between SARS-CoV-2 and other respiratory viruses

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OBJECTIVES/GOALS: To compare rates and types of neurological symptoms in children hospitalized with seizures and respiratory infections, including SARS-CoV-2, influenza, and endemic coronaviruses. METHODS/STUDY POPULATION: Retrospective cohort study of children between 0-21 years of age admitted to a single pediatric free-standing quaternary referral center from January 1, 2014 to June 1, 2021 for seizures who had positive respiratory infection PCR for SARS-CoV-2, other coronaviruses (Coronavirus NL63 and Coronavirus OC34), influenza (A and B), adenovirus, Mycoplasma pneumoniae, and parainfluenza 3 or 4 infections. Patient characteristics including age, race, sex, ethnicity, hospital length of stay, intensive care unit admission, intubation, chest x-ray, and MRI results were included. The primary outcomes were rates of neurological diagnoses and mortality. RESULTS/ANTICIPATED RESULTS: A total of 883 children were included: 68 SARS-CoV-2, 232 influenza, and 187 with other coronaviruses (OC), 214 adenovirus, 20 M. pneumoniae, 121 parainfluenza 3, and 41 parainfluenza 4. Mortality rates were 0% M pneumoniae to 4.9% in parainfluenza 4, with 2.9% in SARS-CoV-2. Encephalopathy was noted in 5-15.6% and strokes were seen in all infections except for coronavirus OC43 and M. pneumoniae, with 4.9% in parainfluenza 4 and 5.9% in SARS-CoV-2. The most common brain MRI abnormality was diffusion restriction. Differences between SARS-CoV-2 and OC were observed in stroke (5.9% vs. 0.5%, p-value=0.019), ICU admission (50% vs. 69%, p-value=0.008), and intubation (19.1% vs. 34.8%, p-value=0.021, respectively). However, the rates of neurological symptoms were similar between SARS-CoV-2 and influenza. DISCUSSION/SIGNIFICANCE: We found higher rates of stroke, but lower rates of ICU admission and intubation in SARS-CoV-2 versus OC. Strokes were observed in many infections. Rates of neurological

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