participation in CT translates to clinical significance in form of drug labels, which inform clinicians on how to prescribe pediatric medications. OBJECTIVES/GOALS: Assessing the extent that the Best Pharmaceuticals for Children Act (BPCA) advances pediatric inclusion in clinical trials (CTs) and the availability of pediatric-specific drug information METHODS/STUDY POPULATION: The BPCA provides the U.S. Food and Drug Administration (FDA) authority to solicit sponsors whose drugs may benefit pediatric populations. Participation is voluntary and provides additional market exclusivity and pediatric information. CTs that received marketing exclusivity from 2016-2018 under BPCA were reviewed using Clinicaltrials.gov to access the legislation's impact. CTs were categorized according to eligibility: (1) pediatric and adult groups, (2) pediatrics, and (3) pediatric sub-groups. Studies were excluded for ambiguous age data. Studies open to both groups were evaluated for pediatric participation. Each drug was searched in DailyMed.com for published pediatric indications. RESULTS/ANTICIPATED RESULTS: Between 2016 - 2018, 22 drugs received marketing exclusivity under BPCA. Of the 196 CTs conducted for these drugs, 135 were available to adults and pediatrics, 10 were available to the entire pediatric population, and 51 were available to specific pediatric sub-populations. Exclusion criteria permitted only 118 of the CTs for assessment where eligibility included both pediatric and adult populations, of which 65 of these had less than 1% pediatric representation. Of the 22 drugs, 20 have pediatric indications. Over this three-year period, the number of CTs where adults and pediatrics were eligible were greater than CTs for pediatric only or pediatric subpopulations. DISCUSSION/SIGNIFICANCE OF FINDINGS: It is prevalent for BPCA compliant CTs to include both; 65% of drugs (13/20) with pediatric indications had more studies involving both groups than only pediatrics. Adequate pediatric CT representation is necessary for developing pediatric drug labeling with meaningful data for clinical indications.

Education/Mentoring/Professional and Career Development

81007

Training Biomedical Engineers in Regulatory Science: Critical Role of Experts from Industry and FDA

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ABSTRACT IMPACT: Lack of regulatory knowledge and education is a key barrier to the translation of medical devices and we describe the design and results for a university graduate-level course providing training on medical device regulatory submissions for approval that can help fill this unmet need and improve and accelerate translational success. OBJECTIVES/GOALS: Within the Indiana CTSI, the Medical Technology Advance Program (MTAP) in the Purdue University Weldon School of Biomedical Engineering (BME) offers three courses in regulatory science and regulatory affairs for medical devices. One course is focused on regulatory submissions for approval, and this report details the course design and evaluation. METHODS/STUDY POPULATION: For Fall 2020, the Regulatory Submissions for Approval course was enhanced to increase participation from regulatory professionals in US FDA and industry, with the core content, curriculum and course design led by BME faculty. The course was taught two days per week and included both in-person and remote (synchronous or asynchronous) attendance options. During the first class session each week a topic was covered in standard lecture format by BME faculty with industry regulatory experience. During the second class session, guests from both industry and FDA were invited to provide in-depth discussion on the topic, share perspectives and viewpoints, present real-world examples, experiences, and case studies, and answer student questions. An end of semester survey evaluated the effectiveness of the course design. RESULTS/ANTICIPATED RESULTS: Medical Device regulatory submissions and related activities were taught including product classification, presubmissions and meetings, 510(k), de novo, EUA, PMA, HDE, and advisory panels. FDA history, regulatory careers, regulatory science, and EU, China, and Japan regulations were also discussed. Overall, 29 speakers from FDA and industry participated live via video calls. A survey completed by 21/23 studentsrevealed overall satisfaction: all reported increased regulatory understanding and 20/21 learned 'a lot' or 'an incredible amount'. The weekly lecture was the top factor contributing to learning, and guest speakers were the next most important factors. Nearly all students indicated FDA and industry speakers were 'very' or 'extremely' valuable/helpful. Additional results will be presented. DISCUSSION/SIGNIFICANCE OF FINDINGS: The three courses are designed to improve medical device translation by training students to better understand regulatory processes and pathways. Survey results and feedback indicated this course was successful. Continued participation from FDA and industry is critical to the learning. Additional case studies will also help enhance learning.

Team Science

Basic Science

70274

TL1 team approach to investigating the adhesin gene fimH in adherent invasive E. coli induced inflammation and colorectal cancer development

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ABSTRACT IMPACT: We are developing the 3D perfusion system for use with patient-derived bacteria to further characterize the mechanism behind bacterial-induced inflammation and cancer. OBJECTIVES/GOALS: We previously reported the adherent invasive E. coli NC101 promote colorectal cancer (CRC) in mice. FimH, a mannose-specific adhesin on type 1 fimbriae, is involved in bacterial surface adhesion. Herein, we investigated the role of FimH in E. coli NC101-induced adherence and carcinogenesis in a novel 3D perfusion culture imaging plate. METHODS/STUDY POPULATION: E. coli NC101 gene fimH was deleted byï ¬Red Recombinase System. Biofilm formation was assessed by crystal violet and congo red staining. 5 dpf (wild-type strain) zebrafish embryos were infected in 6x107 cfu/ml wild type (WT) or fimH-deleted (ï „fimH) E. coli NC101 for 24hr and gut dissected for bacterial

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culture. A 2D/3D infection culture system for IEC-6 and HT-29 cells was infected for 4 hr and imaged and then DNA damage examined by comet assay, cell cycle andÍ³H2AX accumulation. Germ-free (GF) Il10-/- (colitis) mice were orally gavaged with 108 cfu WT orï „fimH E. coli NC101 for 16 weeks. E. coli colonization were quantified by plate culture and qPCR. Lipocalin2 was quantified by ELISA. PCNA and β-catenin were evaluated by immunohistochemistry (IHC). RESULTS/ANTICIPATED RESULTS: Biofilm formation was reduced by more than 40% ($p<0.05$) in E. coli NC101ï „fimH compared to WT strain. Zebrafish larvae showed a 41% decrease in intestinal colonization ofï „fimH compared to WT ($p<0.05$). E. coli NC101-induced DNA damage was reduced by 67% ($p<0.0001$) in HT-29 cells infected withï „fimH compared to WT strain. Using the 3D infection system, a 46% decrease in yH2AX ($p<0.05$) and 42% decrease in G2 cell cycle arrest ($p<0.05$) was observed inï „fimH infected IEC-6 cells compared to WT strain. Furthermore, ï „fimH infected Il10-/- mice showed decreased colonization ($p<0.01$), decreased intestinal inflammation ($p<0.05$), decreased stool lipocalin2 level ($p<0.01$), and reduction of PCNA positive cells in the intestine ($p<0.05$) compared to mice infected with WT strain. DISCUSSION/SIGNIFICANCE OF FINDINGS: Adhesin protein FimH is required by E. coli NC101 to colonize and promote colitis and carcinogenesis both in a 3D perfusion culture and in mice and may serve as potential therapeutic target.

Clinical Trial

10040

Proactive and responsive COVID-19 multidisciplinary research support through the University of Minnesota's Clinical Research Support Center

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ABSTRACT IMPACT: In a global pandemic where data development and dissemination are integral to combating the disease, the Clinical Research Support Center at the University of Minnesota provides a model of comprehensive virtual support, helping to attain and disseminate novel research on COVID-19, its individual and community impact, and treatment initiatives/outcomes. OBJECTIVES/GOALS: The pandemic created massive disruption to the conduct of clinical research with an unprecedented reorientation towards COVID-19. In this fast-paced environment, the Clinical Research Support Center (CRSC) rapidly developed innovative means of supporting diverse research initiatives. METHODS/STUDY POPULATION: The CRSC rapidly transitioned into a virtual environment and developed tools for the clinical research community to enhance remote clinical trial start up. This includes supporting remote consent, eBinders, COVID-19 research training for clinical staff, and easier identification of potential participants for COVID-19 studies; all through virtual support. Support provided research teams guidance on study protocols, regulatory requirements, informatics, biostatistics, financial management, recruitment strategies to support critical, urgent COVID-19 research. We outline proactive examples of how the CRSC now provides support to research teams through the pandemic. RESULTS/ANTICIPATED RESULTS: From March-November 2020, 116 COVID-19 projects received virtual support from the CRSC for COVID-19 research: disease understanding (n=27), treatment (n=23), pandemic impact (n=20), clinical care innovation (n=18), disease control and surveillance (n=10), prevention (n=9), detection (n=5), and impact on minorities (n=4). The diversity of these studies demonstrates the demand for and benefit from multidisciplinary expertise supporting study design and implementation. Through successful articulation and acceleration of research activities, the CRSC met the need for speed and rapidly adapted to new challenges created by the pandemic. DISCUSSION/SIGNIFICANCE OF FINDINGS: In a global pandemic where rapidly changing barriers to research is ongoing, through multidisciplinary efforts, the CRSC continues to provide comprehensive, virtual support to attain and disseminate novel research on COVID-19, its individual and community impact, and treatment initiatives/outcomes.

39901

Breaking down silos to synergize clinical trial development and initiation: The Clinical Research Support Center, University of Minnesota

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ABSTRACT IMPACT: The model of the Clinical Research Support Center at the University of Minnesota of streamlining clinical trial infrastructure can be leveraged by the larger clinical trial community to create valuable efficiencies and facilitate faster initiation of research activities by supporting researchers from concept to dissemination. OBJECTIVES/GOALS: Substantial time, energy, and money are spent bridging disparate resources in research. We describe how the University of Minnesota's (UMN) Clinical Research Support Center (CRSC) streamlines trial infrastructure, creating valuable efficiencies to support researchers from concept to dissemination. METHODS/STUDY POPULATION: The CRSC, established in 2018 through the Clinical and Translational Science Award (CTSA) program, brings resources together in a single, centralized, and convenient location to help researchers navigate the UMN clinical research startup process and specifically to assist with the development and initiation of a research study from feasibility assessment to project opening. Diverse expertise in components of human subject research is available to support the broad scope of projects at a large institution like the UMN. We present how CRSC services, when coordinated by Clinical Research Specialists, have

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