

is challenging, and teams vary in their success. This study builds the evidence of key barriers and facilitators to effective community-engaged team science by drawing on the perspectives of seasoned researchers and community partners. **METHODS/STUDY POPULATION:** We conducted 3 focus groups with academic researchers (n=9) and 2 focus groups with community research partners (n=8). All participants were adults from the Southern California area, and had experience working on research teams that included academics and community partners. The focus group guide included questions about the participant's experience with community-engaged research, including the value of these partnerships, examples of success and challenges, and opportunities for improvement. Transcriptions of the focus group recordings were analyzed to identify key themes and insights, and to explore similarities and differences between academic and community participant perspectives. **RESULTS/ANTICIPATED RESULTS:** Both researchers and community partners saw the potential value of participating in community-engaged research. However, they identified challenges to address, including: 1) Community partners should be invited to participate in early stages of the research process as equal partners to help frame the objectives. 2) Community partner's knowledge should be valued through the use of their ideas and input, and providing monetary compensation for their time. 3) Academic researchers should aim to build long-term meaningful relationships with the community and build cultural competency (language, culture, and trust). 4) Community partners should be closely involved with the interpretation of results to confirm accuracy and identify valuable insights, and these contributions should be acknowledged. **DISCUSSION/SIGNIFICANCE:** Community partners being undervalued is a central challenge of community-engaged research teams. Greater adoption of best practices in team science could empower community partners and increase the value of this research. Structural barriers related to research funding and academic promotion should align to support these efforts.

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### Using Contingency Management to Understand the Cardiovascular, Immune and Psychosocial Benefits of Reduced Cocaine Use: A Protocol for a Randomized Controlled Trial

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**OBJECTIVES/GOALS:** Contingency management (CM) procedures yield measurable reductions in cocaine use. This poster describes a trial aimed at using CM as a vehicle to show the biopsychosocial health benefits of reduced use, rather than total abstinence, the currently accepted metric for treatment efficacy. **METHODS/STUDY POPULATION:** In this 12-week, randomized controlled trial, CM was used to reduce cocaine use and evaluate associated improvements in cardiovascular, immune, and psychosocial well-being. Adults aged 18 and older who sought treatment for cocaine use (N=127) were randomized into three groups in a 1:1:1 ratio: High Value (\$55) or Low Value (\$13) CM incentives for cocaine-negative urine samples or a non-contingent control group. They completed outpatient sessions three days per week across the 12-week intervention period, totaling 36 clinic visits and four post-treatment

follow-up visits. During each visit, participants provided observed urine samples and completed several assays of biopsychosocial health. **RESULTS/ANTICIPATED RESULTS:** Preliminary findings from generalized linear mixed effect modeling demonstrate the feasibility of the CM platform. Abstinence rates from cocaine use were significantly greater in the High Value group (47% negative; OR = 2.80; p = 0.01) relative to the Low Value (23% negative) and Control groups (24% negative). In the planned primary analysis, the level of cocaine use reduction based on cocaine-negative urine samples will serve as the primary predictor of cardiovascular (e.g., endothelin-1 levels), immune (e.g., IL-10 levels) and psychosocial (e.g., Addiction Severity Index) outcomes using results from the fitted models. **DISCUSSION/SIGNIFICANCE:** This research will advance the field by prospectively and comprehensively demonstrating the beneficial effects of reduced cocaine use. These outcomes can, in turn, support the adoption of reduced cocaine use as a viable alternative endpoint in cocaine treatment trials.

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### The viscous and fermentability properties of dietary fiber impact on chronic kidney disease-mineral and bone disorder\*

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**OBJECTIVES/GOALS:** Dietary fiber has been used in other clinical populations to improve mineral disorders, but there is limited data in chronic kidney disease, despite the high prevalence of mineral and bone disorder (known as CKD-MBD). Our objective was to evaluate the effect of dietary fiber based on viscosity and fermentability on CKD-MBD outcomes. **METHODS/STUDY POPULATION:** 22-week-old male CKD rats (mild-to-moderate CKD) were randomly assigned to receive one of four fiber treatments (10% w/w each) based on fermentability and viscosity: 1) Cellulose (-fermentability, -viscosity), 2) Inulin (+fermentability, -viscosity), 3) Psyllium husk (-fermentability, +viscosity), or 4) Pectin (+fermentability, +viscosity). Treatments lasted 10 weeks, and rats were euthanized at 32 weeks of age (kidney failure). Rats were placed in metabolic cages for 3 consecutive days the last week before euthanasia for mineral balance. At euthanasia, blood, tibia, heart, and aorta were collected for CKD-MBD assessment. Additional tissues collected included kidneys and all intestinal segments. **RESULTS/ANTICIPATED RESULTS:** Our preliminary data indicates that weight trajectories and survival were similar between treatment groups. At 33 weeks of age, kidney weight index (an indirect measurement of kidney function as this animal model develops polycystic kidneys) was lower in the psyllium-treated rats compared to all of the other treatments. Plasma phosphorus was lower with Psyllium and Pectin compared to Cellulose-treated rats. Left ventricular mass index was lower in the Inulin, Psyllium, and Pectin-treated rats compared to the Cellulose-treated rats. Ongoing tissue analyses include biochemical markers of mineral and bone metabolism (parathyroid hormone, fibroblast growth factor-23, and phosphorus balance), bone parameters (dynamic histomorphometry and microCT), and cardiovascular calcification. **DISCUSSION/SIGNIFICANCE:** Our preliminary data indicate that dietary fiber based on fermentability and viscosity impacts CKD-MBD outcomes and may be an innovative, low-cost intervention that

can be trialed in people with CKD for the prevention and treatment of CKD-MBD.

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### Metformin normalizes impaired renal and cardiac function in a rat model of transient undernutrition

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**OBJECTIVES/GOALS:** In the U.S., over 4 million people including children experience transient periods of undernutrition annually. Cardio-metabolic and renal diseases are more prevalent in this population. We are investigating therapeutic strategies to reverse the long-term risk of these diseases in a rat model of transient undernutrition followed by refeeding. **METHODS/STUDY POPULATION:** Thirty six female Fischer rats (3-months of age) were initially divided into 2 groups. Half were fed regular chow (CT) while the other half were severely food restricted (sFR) by 60% from 0-2 weeks (wks) followed by refeeding from 2-14 wks (sFR-Refed). These 2 groups were then subdivided and treated  $\pm$  metformin (Met) from wk 7 to wk 12 (n=9/group). High precision ultrasound was conducted on live rats to assess heart and kidney function immediately after the sFR period ended (wk 2) and at the end of the study (wk 14). At the conclusion of the experiment, the rats were sacrificed and the histology of the kidney and heart tissues were analyzed in hematoxylin and eosin-stained sections. The protein to DNA ratio was also calculated in homogenates from these tissues. **RESULTS/ANTICIPATED RESULTS:** In sFR-Refed rats, cardiac output (CO), heart rate (HR) and renal artery blood flow (RBF) were decreased by  $11 \pm 1.5\%$ ,  $7.0 \pm 6.0\%$  and  $22 \pm 0.6\%$ , respectively, compared to control (CT) rats; #p<0.05. Mean glomerular diameter was reduced in the kidneys of sFR-refed rats compared to CT and this effect was attenuated by metformin treatment [( $\mu$ m): CT,  $406 \pm 31$ ; sFR-Refed,  $383 \pm 11$ , p<0.06; CT+Met,  $393 \pm 18$ ; sFR-Refed+Met,  $407 \pm 18^*$ ]. Furthermore, the mean cardiomyocyte thickness was reduced in sFR-Refed rats compared to controls while metformin treatment prevented this effect [( $\mu$ m): CT,  $16.4 \pm 3.6$ ; sFR-Refed,  $11.5 \pm 2.3\#$ ; CT+Met,  $16.4 \pm 3.6$ ; sFR-Refed+Met,  $15.9 \pm 3.2^*$ ]. #p<0.05 vs. CT, same treatment; \*p<0.05 vs. Met, same diet; two-way ANOVA. **DISCUSSION/SIGNIFICANCE:** These findings have promising implications for metformin use to mitigate long-term impairments in heart and kidney structure and function in individuals who have experienced bouts of undernutrition earlier in life for either voluntarily (e.g., very low calorie dieting) or involuntary (e.g., very low food security) reasons.

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### A Nationwide Pilot Study Testing a Remotely-Delivered Prolonged Nightly Fasting Intervention in Stressed Midlife Adults Living with Obesity and Memory Decline

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**OBJECTIVES/GOALS:** Cognitive decline is associated with obesity, stress, poor sleep, and circadian rhythm misalignment, which are themselves functionally intertwined. Irregular food intake timing exacerbates these all. Prolonged nightly fasting (PNF) aligns food

intake with innate circadian rhythms. **METHODS/STUDY POPULATION:** A nationwide, remotely-delivered, 2-arm randomized controlled trial was conducted to assess feasibility and 8-week outcomes of cognition, stress, sleep, eating behaviors, and general eating habits, after a PNF intervention (14-hr nightly fast, 6 nights/week, no calories after 8pm) compared to a health education control (HEC) condition. Eligible participants were living with obesity, stress (Perceived stress scale-4 (PSS-4) total score  $\geq 5$ ), and memory “not as good as it used to be.” Data were collected via Zoom meetings with participants and trained staff and entered into REDCap. All participants had weekly staff check-in calls to report fasting times (PNF group only) and feedback. **RESULTS/ANTICIPATED RESULTS:** Eligible participants were enrolled from 37 of 50 US states; N=58, 86% women, 71% white, 93% non-Latinx, mean (SD) 50.1 (5.1) years of age, BMI 35.6 (3.6) kg/m<sup>2</sup>. No group differences existed at baseline. Linear mixed-effects models were used to compare group differences across all outcome changes. Compared to the HEC condition, the PNF intervention was associated with improved sleep quality (Pittsburgh Sleep Quality Index; B = -2.52; SE = 0.90; 95% CI -4.30 to -0.74; p=0.006). Stress, everyday cognition, and emotional eating behavior significantly changed over time (p<0.02), but there were no group differences. Analysis of feasibility outcomes are on-going. **DISCUSSION/SIGNIFICANCE:** Changing food intake timing 6 days per week, to exclude nighttime eating without mandating food quality/quantity change, may benefit many individuals living with obesity, stress and memory decline to improve their sleep. Improved sleep quality may lead to more health benefits over time.

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### Substance Abuse Research: Bench to Community (SARB2C) as a Model for Team Science

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**OBJECTIVES/GOALS:** To present Substance Abuse Research: Bench to Community (SARB2C) as a model for team science both within and between institutions. Emerging from targeted efforts by the NIH to engage translational scientists in prominent public health issues, the initiative illustrates the benefits of bringing together researchers and trainees to share ideas. **METHODS/STUDY POPULATION:** In 2019 a group was formed at University of Florida to discuss ongoing translational research in the area of substance abuse, including faculty, staff, and trainees from across the campus. The group was expanded in February 2022 to include domestic colleagues at the University of Kentucky as well as international collaborators at Chulalongkorn University in Bangkok, Thailand. One-hour monthly meetings began in person but now take place virtually. Larger projects are discussed individually, focusing on opportunities for collaboration. Attendees also provide updates on their work, including proposals in development and manuscripts in process. This facilitates dialogue around the science, from the bench to the community, and connects people to advance team science. **RESULTS/ANTICIPATED RESULTS:** In light of the ongoing opioid epidemic and the public health threat of other essential substances, collaboration among researchers in this area is essential to advance the science and explore real-world solutions. SARB2C demonstrates the benefit of connecting researchers across T0 to T4, and that of including trainees for invaluable experience. This environment fosters open discussion and creativity and helps break down the silos that impede science. A highlight from early in the