

time-varying covariates. Age and education were included as time-invariant covariates. General estimating equations showed that pain persistence over two waves, reported in 35% of the sample, increased MCI odds by 57% (OR=1.57, 95%CI: 1.28 to 1.94). Pain persistence over three waves, reported in 17% of the sample, increased MCI odds by 98% (OR=1.98, 95%CI: 1.44 to 2.70). The findings emphasize the role of pain in earlier stages of dementia and the potential importance of pain management in offsetting cognitive decline.

Session 1440 (Symposium)

NEW DIRECTIONS IN DIETARY RESTRICTION: REMEMBERING EDWARD MASORO

Chair: Arlan Richardson

In 1935, Clive McCay reported that severe restriction of food increased the lifespan of male rats. In the following four decades, several laboratories replicated this observation with less severe restrictions, which will be referred to as dietary restriction (DR). However, there were concerns even in the aging community in the 1970s as to whether DR increased lifespan by retarding aging. It was the research of two former Kleemeier Awardees, Edward Masoro and Roy Walford, that conclusively demonstrated in the 1980s that DR retarded aging resulting in improved healthspan and reduced pathology. Ed Masoro's research was focused on lipid metabolism when he was invited to attend a workshop on metabolism and aging in 1969. His interest in aging was piqued such that the more he learned about aging, the more interested he became. In a subsequent workshop in 1973, Ed heard Morris Ross describe his research on restricting food intake on cancer and longevity. Ed was impressed that a relatively simple manipulation had such dramatic effects, and he decided to focus his research on DR. After an extensive review of the DR literature up to the 1970s, Ed established the 40% restriction paradigm, which is used in almost all DR studies to date. Ed's group was the first to study aging and DR under barrier conditions which he established at San Antonio. Over the next two decades, Ed would direct a Program Project that showed DR had a dramatic effect on most age-related pathologies and improved many physiological functions. Studying the restriction of fat, protein, micronutrients, Ed came to the conclusion that total calories consumed was a key factor in the effect of DR on longevity. His group was the first to show that DR significantly reduced circulating levels of glucose and insulin, which was subsequently shown to occur because of increased insulin sensitivity and is now recognized as a hallmark of DR and potentially important in the anti-aging action of DR. Ed was chair of the Biological Sciences Section of GSA in 1979 and President in 1995. This session is dedicated to Edward Masoro who passed away on July 11, 2020 at the age of 95. Dr. Masoro was president in 1995 and BS chair in 1979, Clive McCay was President in 1949.

INTERMITTENT FASTING: FROM CALORIES TO TIME RESTRICTION

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Classic implementation of calorie restriction (CR) in laboratory animals increases health and longevity in most model organisms. Traditionally, chronic CR is the reduction

of daily energy intake without malnutrition. Recently, paradigms have emerged that recapitulate some of the beneficial aspects of this intervention, avoiding some of its challenges. The length of daily fasting length and periodicity have emerged as potential drivers behind CR's beneficial health effects. Numerous strategies and eating patterns, including prolonged periods of fasting, have been successfully developed to mimic many of CR's benefits without its austerity. These new feeding protocols range from short mealtimes designed to interact with our circadian system (daily time-restricted feeding) to more extended fasting regimens known as intermittent fasting. We will discuss the current status of knowledge on different strategies to reap the benefits of CR on metabolic health in rodent models and humans without the rigor of chronic reductions in caloric intake.

IMPACT OF CALORIC RESTRICTION ON MOLECULAR AND FUNCTIONAL NETWORKS IN RHESUS MONKEYS

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Caloric restriction (CR) delays aging and the onset of age-related disease in diverse species. Several diseases of aging including diabetes, cancer, and neurodegeneration, have an established metabolic component. Although the mechanisms of CR remain unknown, numerous factors implicated in longevity regulation by CR converge on regulation of metabolism. The reprogramming of metabolism with CR is tissue specific, but mitochondrial activation and changes in redox metabolism are among the shared features. Changes in non-coding miRNA and in processing of transcripts are contributing mechanisms in integrating metabolic and growth pathways. Our studies in simple cell culture shows that small changes in metabolic status can precipitate large-scale multi-modal functional changes across cellular processes. We propose that modest failures in metabolic integrity with age broadly impact homeostasis and adaptation, creating shared vulnerability to diseases and conditions despite differences in their etiology, and that CR harnesses this same axis to promote health and enhanced longevity.

CIRCADIAN ALIGNMENT OF FEEDING REGULATES LIFESPAN EXTENSION BY CALORIC RESTRICTION

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Caloric restriction (CR) promotes longevity in several species. Classic CR protocols often lead to chronic cycles of 2h-feeding/22h-fasting, raising the question whether calories, fasting or time of day are causal. To address this, we tested an AL control group and five CR protocols with different timing and duration of feeding/fasting cycles. C57BL/6J male mice were subjected to 30% CR as one single meal a day at the beginning of the day or night (classical protocols with < 2h feeding, CR-day and CR-night), or smaller meals distributed for 12h (CR-day-12h and CR-night-12h), or evenly spread out throughout 24h (CR-spread) to abolish the otherwise daily feeding pattern adopted by nocturnal animals. We found that CR alone is sufficient to extend lifespan without

fasting. However, the benefits are enhanced if feeding/fasting cycles are present and match their normal nocturnal activity. Circadian alignment of feeding with at least 12h fasting boosts CR-mediated increase on survival in mice, independently body weight. Aging leads to widespread upregulation of inflammation-related genes and downregulation of metabolic pathways in liver from ad lib fed mice; whereas CR at night ameliorates these aging-related changes and preserves circadian oscillations in gene expression. Overall, our results demonstrate that circadian interventions promote longevity and provide a novel perspective for elucidating mechanisms of aging.

THE IMPACT OF SHORT-TERM DIETARY RESTRICTION ON STEM CELL FUNCTION

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Stem cells play a critical role in the maintenance of tissue function and their proliferative/regenerative capacity is essential to this role. Because stem cells persist over the lifespan of an animal, they are susceptible to gradual accumulation of age-associated damage, resulting in the loss of regenerative function that can impair organ function. Understanding the mechanism(s) that regulates stem cell function is essential for retarding the aging process, and stem cells are attractive targets for aging interventions. Dietary restriction (DR), the most robust anti-aging intervention to-date, has been shown to enhance the activity and integrity of stem cells in a variety of tissues (e.g., muscle, bone marrow, and intestine), and it is believed that effect of DR on stem cells plays an important role in the anti-aging action of DR. For example, DR has been shown to preserve and increase the number of intestinal stem cells (ISCs) and enhance their regenerative capacity in young animals. Data from my lab shows that ISCs from old mice have limited proliferation activity and form few if any organoids in vitro (a surrogate for a fully functional crypt) and that ISCs isolated from old mice on life-long DR show an improved ability to form organoids. While it is well accepted that life-long DR increases lifespan and has anti-aging effects an important aspect of DR that has been largely overlooked is that DR implemented only for a short time early in life can increase lifespan of rodents even when rodents are fed ad libitum the remainder of their life. In line with this, we recently found that ISCs from old mice fed DR for only a short-period resulted in a dramatic increase in ability of the ISCs to form organoids. This is the first evidence that short-term DR administrated late in life can rescue the loss in ISC function that occurs with age.

Session 1445 (Symposium)

NURSING HOME SOCIAL WORK WITH RESIDENTS WITH SEVERE MENTAL ILLNESS, THOUGHTS OF SUICIDE, OR DEMENTIA

Chair: Mercedes Bern-Klug

Discussant: Amy Restorick Roberts

Many of the close to 3 million persons who receive care in a U.S. nursing home in any given year face mental-health-related challenges that range from minor to severe. One of the core professionals involved with care planning for the psychosocial needs of nursing home residents with mental health concerns is the social worker. Reporting data from a

2019 nationally representative survey of nursing home social services directors, this session provides information about the training needs of nursing home social workers in terms of their work with residents diagnosed with a severe mental illness such as schizophrenia or severe depression, residents who are suicidal, and residents with dementia.

DEMENTIA CARE INVOLVEMENT AND TRAINING NEEDS OF SOCIAL SERVICES DIRECTORS IN U.S. NURSING HOMES

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This study describes social services directors' involvement in dementia care in U.S. nursing homes, focusing on interest in and needs for dementia care training. Respondents were 841 social service directors from U.S. nursing homes. We found that 87% of social service departments engaged in cognitive assessment; 59% of social services directors were strongly interested in dementia care training, and 23% would need up to 10 hours of preparation time or would not be able to train staff on dementia-related care. Racial minority background, fewer years of experience in nursing homes, and barriers to staffing predicted strong interest in dementia care training. These findings demonstrate social services directors' active involvement in dementia care and need for training.

NURSING HOME SOCIAL SERVICES DIRECTORS CARING FOR RESIDENTS WITH SERIOUS MENTAL ILLNESS

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Psychosocial care for residents with serious mental illness (SMI) requires understanding of co-morbidities and careful attention to needs, rights, and preferences. Analyses of social services directors (SSDs) responses (n=924) to the National Nursing Home Social Service Director Survey considered perceived roles and competence to provide care stratified by the percentage of NH residents with SMI. Depression screenings and biopsychosocial assessments were common roles regardless of the percentage of residents with SMI. About one-quarter lacked confidence to train colleagues in recognizing distinctions between depression, delirium and depression (23.4% unable) or to develop care plans for residents with SMI (26% unable). A bachelor's degree (OR=0.64, 95% CI:0.43, 0.97) or less (OR= 0.47, 95% CI:0.25, 0.89) was associated with less perceived competence in care planning compared to those with a master's degree. SSDs reported less involvement in referrals or interventions for resident aggression in homes with a high proportion of residents with SMI.

NURSING HOME SOCIAL SERVICES DIRECTORS' ROLES AND SELF-EFFICACY IN SUICIDE RISK MANAGEMENT

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