

Eating earlier in the day is associated with less cancer-related fatigue: Insights from the Women's Healthy Eating and Living (WHEL) study

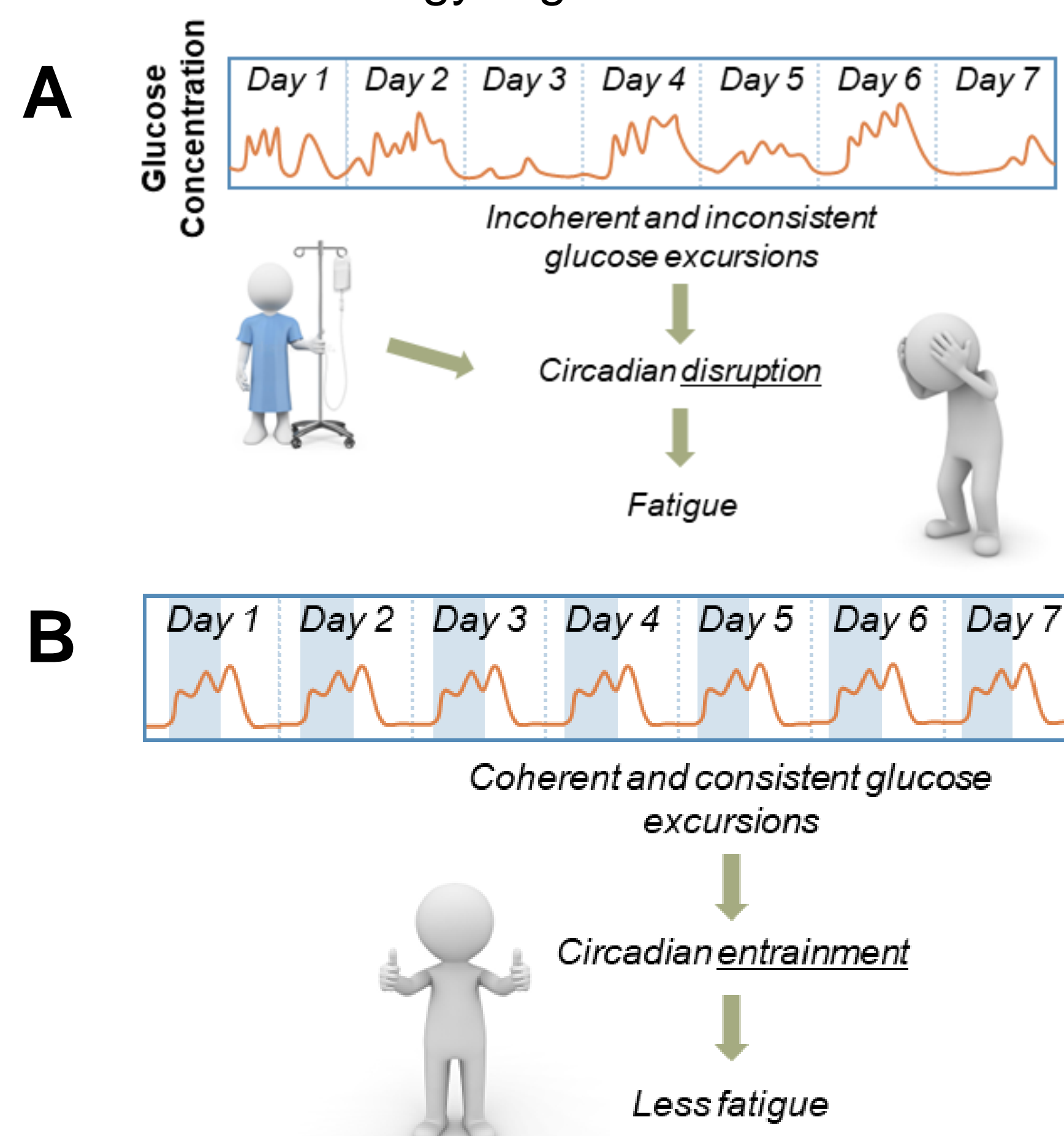
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Cancer-related fatigue is common and debilitating

- Cancer-related fatigue affects 30-90+% of patients with cancer.¹
- Cancer-related fatigue is unlike day-to-day fatigue in that it cannot be alleviated by sleep or rest.
- This fatigue can persist for months and even years after treatment.
- Persistent fatigue can greatly affect the ability to perform activities of daily living and can greatly reduce quality of life.
- There are few effective treatments, largely because the etiology and pathophysiology are poorly understood.²

Theory: concordance between eating and daylight will be associated with less cancer-related fatigue

- **Cancer³** and **cancer therapies⁴** contribute to circadian dysregulation.⁵
- **Nutrient timing** may help regulate the circadian clock.⁶⁻⁸
- Fasting also initiates healthful metabolic processes that involve energy regulation.



Objectives

- To assess associations between nutrient timing and patient-reported fatigue
- To assess associations between meal timing consistency and patient-reported fatigue



Methods

- Clinicaltrials.gov: NCT00003787 (Catherine Marinac and John Pierce at University of California San Diego)⁹
- Baseline data were assessed
- **Eligibility:**
 - Female
 - Stage I, II, or IIIA invasive breast cancer within the previous 4 years
 - Age 18–70 years at diagnosis
 - Completed cancer treatment and have no evidence of cancer
- **Eating window** was calculated from 4-day time-stamped food records
- **Patient-reported fatigue** was measured using the 9-item *Energy* scale of the Thoughts and Feelings Questionnaire and a single-item *Tired* question.
- **Linear regression models** were adjusted for age, body mass index, comorbidities, education, marital status, exercise habits, time since diagnosis, and anti-estrogen use.

References

1. Al Maqbali et al. (2020) J Pain Symptom Management, 13: 1012-1039.
2. Mustian KM, Kleckner AS, et al. (2017) JAMA Oncol 3: 961-968.
3. Sulli et al. (2019) Trends Cancer, 5: 475-494.
4. Roscoe et al. (2002) Supportive Care in Cancer, 10: 329-336.
5. Liu et al. (2013) Fatigue, 1: 12-26.
6. Chaix et al. (2009) Annu Rev Nutr, 39: 291-315.
7. Wilkinson et al. (2020) Cell Metab, 31: 1-13.
8. Melkani et al. (2017) J Physiol, 595: 3691-700.
9. Pierce et al. (2007) JAMA 298:289-298.

Results

| | n=2,914 |
|--|----------------------|
| | Mean ± SE or n (%) |
| Age (years) | 52.7 ± 9.0 |
| Ethnicity | |
| White, not Hispanic | 2492 (86%) |
| Black, not Hispanic | 106 (4%) |
| Hispanic | 156 (5%) |
| Other | 160 (6%) |
| Body mass index (kg/m ²) | 27.3 ± 6.1 |
| Time since diagnosis (years) | 1.9 ± 1.1 |
| Treatment | |
| Surgery | 2913 (100%) |
| Chemotherapy | 2036 (70%) |
| Radiation | 1788 (61%) |
| Anti-estrogen use (currently) | 1796 (62%) |
| Exercise habits (Metabolic equivalents per week) | 871.7 ± 880 |
| Modified Healthy Eating Index | 54.66 ± 8.36 |
| Average eating window (hours) | 11.58 ± 1.59 |
| Variation in eating window (hours) | 1.78 ± 1.11 |
| Time of last meal | 7:26pm (1 h, 12 min) |

Length of eating window was not associated with fatigue

| Meal timing measure | Tiredness | | Energy | |
|---------------------------|-----------------|---------|----------------|---------|
| | Estimate ± SE | p-value | Estimate ± SE | p-value |
| Eating window (minutes) | 0.0066 ± 0.4816 | 0.989 | 0.197 ± 0.226 | 0.385 |
| Start time | 0.026 ± 0.010 | 0.014* | -0.801 ± 0.291 | 0.006* |
| End time | 0.022 ± 0.010 | 0.027* | -0.450 ± 0.275 | 0.102 |
| SD in eating window (min) | 0.002 ± 0.698 | 0.998 | -0.199 ± 0.327 | 0.543 |
| SD in start time | -0.003 ± 0.013 | 0.797 | -0.220 ± 0.370 | 0.552 |
| SD in end time | 0.020 ± 0.013 | 0.128 | -0.209 ± 0.368 | 0.571 |

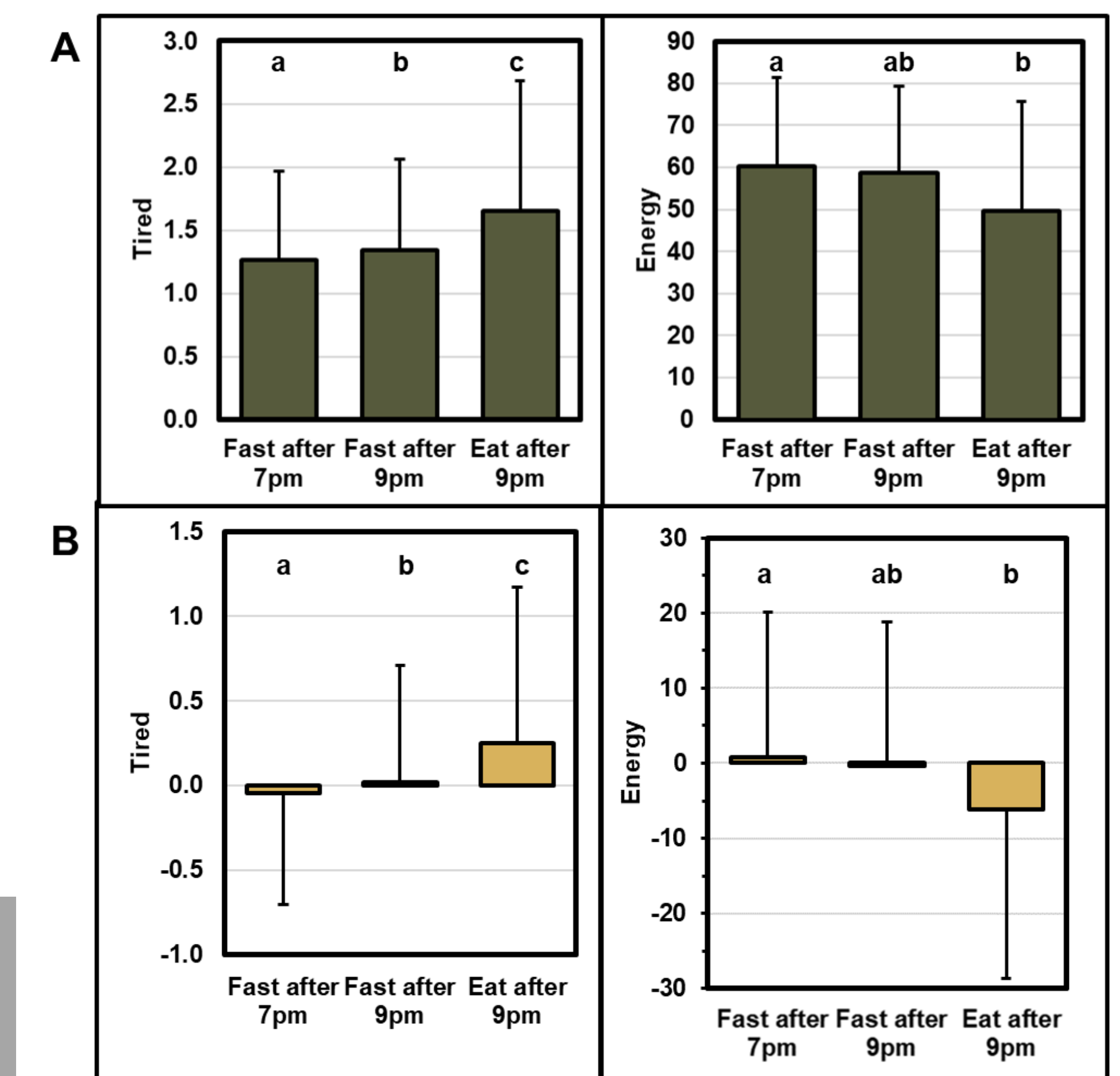
*p<0.05

- Earlier start and end times were associated with less fatigue
- Consistency in eating window was not associated with fatigue (as measured as standard deviation, with a higher SD=more inconsistent)

Funding

USA National Institutes of Health (NIH) no. UL1TR003098,
Maryland Department of Health's Cigarette Restitution Fund Program, no. CH-649-CRF

Eating after 9pm was associated with more tiredness and less energy



Tiredness and energy levels according to time of last meal at baseline. n=1,125 for 'fast before 7pm' (have last meal/snack before 7pm), n=1,737 for 'fast after 9pm,' and n=52 for 'eat after 9pm.' Error bars depict SD. Different lowercase letters indicate p<0.05 in Tukey HSD comparisons. A) Unadjusted plots. B) Values are adjusted for confounding factors.

Conclusions

- An earlier start time and earlier end time for daily eating windows were associated with less fatigue.
- Dietary interventions that encourage breakfast and discourage eating after 7pm should be tested to alleviate persistent cancer-related fatigue.

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May 31, 2023