



HEALTHCARE
EVOLUTION

INTERMITTENT FASTING

*Just a cool way of saying 'skipping breakfast'? Or,
is there actually something to it?*



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EMPOWERING AS MANY PEOPLE AS POSSIBLE TO LIVE A HAPPIER AND HEALTHIER LIFE!

PRESENTER DISCLOSURES

I have the following relationships with these commercial interests:

- Founder: Healthcare Evolution Inc.
- Consulting/Contracting Fees: Novo Nordisk – Obesity C.A.R.E Service; SRx Pharmacy – Calgary, AB
- Grant Funding: Canadian Foundation for Pharmacy – Innovation Fund Grant
- Advisory Board: CPhA Board Representative on the Pharmacy Examination Board of Canada (PEBC) Board of Directors
- Committee: Co-President for Obesity Canada Calgary Chapter

I have received no speaker's fee or support for this learning activity.



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LEARNING OBJECTIVES

- 1) Explore what is intermittent fasting?
- 2) Discuss the science for potential benefits and harms
- 3) Review considerations and practicality



WHAT IS INTERMITTENT FASTING?

- Fasting has been done for ages - part of human evolution, religious reasons, etc.
- In 2012, it got highly popularized by the TV documentary *Eat, Fast, Live Longer* from BBC broadcast journalist Dr. Michael Mosley's and the book *The Fast Diet* by Kate Harrison



WHAT IS INTERMITTENT FASTING?

- Dietary regimen
 - No specific foods recommended rather it's more WHEN you should eat
- Involves restricting food (energy) intake to specific periods of time
- Variety of different methods and strategies
- Common religious fasts
 - Ramadhan; Lent; Greek Orthodox fasts



WHAT IS INTERMITTENT FASTING?

- **Periodic Fasting (PF)**
 - Cyclical feeding pattern involving fasting (consuming 25% or less of required calories)
 - Fasting 1-2 days per week then eating ad libitum (at one's pleasure) in once or twice weekly regimens
 - i.e. 5:2 Diet
- **Alternate Day Fasting (ADF)**
 - Cyclical feeding pattern involving complete fasting (no calorie intake) for a period of 24 hours, followed by ad libitum feeding for 24 hours
 - Some people may modify and consume 25% of their maintenance calories on fasting days
- **Time-Restricted Feeding**
 - Complete fasting (no caloric intake) for at least 12 hours per day with ad feeding for the rest of the day and this is done on a daily basis
 - 16/8 Diet; Warrior Diet

libitum



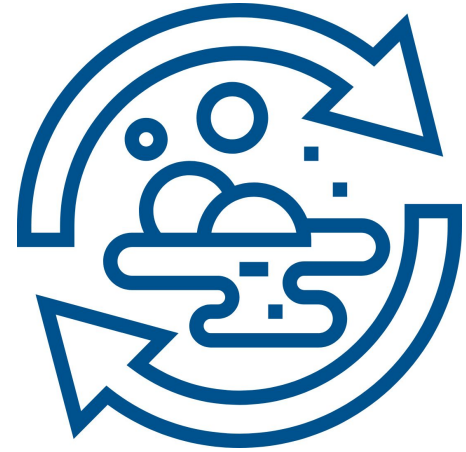
WHAT IS INTERMITTENT FASTING?

- Utilizing a number of biological and physiological adaptations that we have developed in order to keep us alive during times when food is scarce
 - Other animals/organisms have shown similar patterns i.e. yeast goes dormant; bears hibernate
- Eating similar to our caveman ancestors



WHY INTERMITTENT FASTING?

- Metabolic Syndrome and Obesity Epidemic
 - Cluster disease markers such as excess stomach fat, increased blood sugar, high cholesterol, increased blood pressure
 - Increased risk of Diabetes, Heart Attack, Stroke, Heart Failure, and Death
 - Heart disease is the leading cause of death worldwide
- Contributing Factors
 - Sedentary lifestyle
 - Smoking
 - High salt, sugar, and fatty acid intake
 - Genetics
 - Environment
 - Erratic dietary patterns?



WHY INTERMITTENT FASTING?

- Modern Dietary Patterns
 - Eating over prolonged periods (>15 hours/day) and eating more than 3 meals per day have been associated with Obesity and Diabetes
 - Misalignment of food intake with circadian rhythm (Sleep-Awake Cycle)
 - May contribute to increased risk of heart disease, and metabolic issues



INTERMITTENT FASTING TO THE RESCUE?

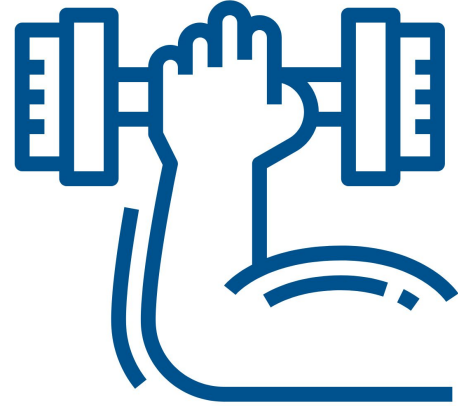


CRAIG 'THE GYM BRO' WILL TELL YOU...



CRAIG 'THE GYM BRO' WILL TELL YOU...

- Burn fat easily
- Live longer
- Prevent and cure cancer
- Cure diabetes and insulin resistance
- Reduce inflammation and stress
- Improve cholesterol
- Decrease blood pressure and cholesterol
- Prevent Alzheimer's and Parkinson's disease
- Treat Multiple Sclerosis



MY RESEARCH PROCESS...

- Human Trials > Animal Trials
 - In animals trials we have more control
- Interventional Trials > Observational Trials
 - Removing as many variables as possible - results more likely to be true
- Length, number of participants, and procedures all matter...
- Surrogate vs. Clinical/Hard Outcomes
 - Surrogate = decrease in a number (i.e. decrease in BP; CRP)
 - In theory could lead to reduction in clinical outcomes, but maybe not
 - Clinical Outcomes = reduced # of heart attacks; strokes
 - Demonstrated reduction in the study
- Nutrition literature is challenging
 - Not a pill 1x/day - it's your dietary patterns
- Long lasting effects?



WHAT DOES THE SCIENCE SAY?

The NEW ENGLAND JOURNAL of MEDICINE

REVIEW ARTICLE

Dan L. Longo, M.D., *Editor*

Effects of Intermittent Fasting on Health, Aging, and Disease

Rafael de Cabo, Ph.D., and Mark P. Mattson, Ph.D.

ACCORDING TO WEINDRUCH AND SOHAL IN A 1997 ARTICLE IN THE *JOURNAL*, reducing food availability over a lifetime (caloric restriction) has remarkable effects on aging and the life span in animals.¹ The authors proposed that the health benefits of caloric restriction result from a passive reduction in the production of damaging oxygen free radicals. At the time, it was not generally recognized that because rodents on caloric restriction typically consume their entire daily food allotment within a few hours after its provision, they have a daily fasting period of up to 20 hours, during which ketogenesis occurs. Since then, hundreds of studies in animals and scores of clinical studies of controlled intermittent fasting regimens have been conducted in which metabolic switching from liver-derived glucose to adipose cell–derived ketones occurs daily or several days each week. Although the magnitude of the effect of intermittent fasting on life-span extension is variable (influenced by sex, diet, and genetic factors), studies in mice and nonhuman primates show consistent effects of caloric restriction on the health span (see the studies listed in Section S3 in the Supplementary Appendix, available with the full text of this article at [NEJM.org](https://www.nejm.org)).

From the Translational Gerontology Branch (R.C.) and the Laboratory of Neurosciences (M.P.M.), Intramural Research Program, National Institute on Aging, National Institutes of Health, and the Department of Neuroscience, Johns Hopkins University School of Medicine (M.P.M.) — both in Baltimore. Address reprint requests to Dr. Mattson at the Department of Neuroscience, Johns Hopkins University School of Medicine, 725 N. Wolfe St., Baltimore, MD 21205, or at mmattso2@jhmi.edu.

This article was last updated on February 12, 2020, at [NEJM.org](https://www.nejm.org).

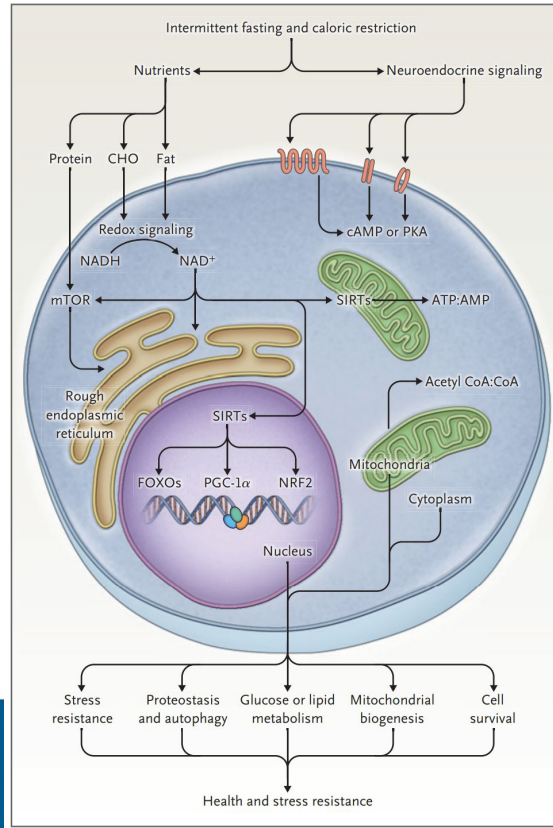
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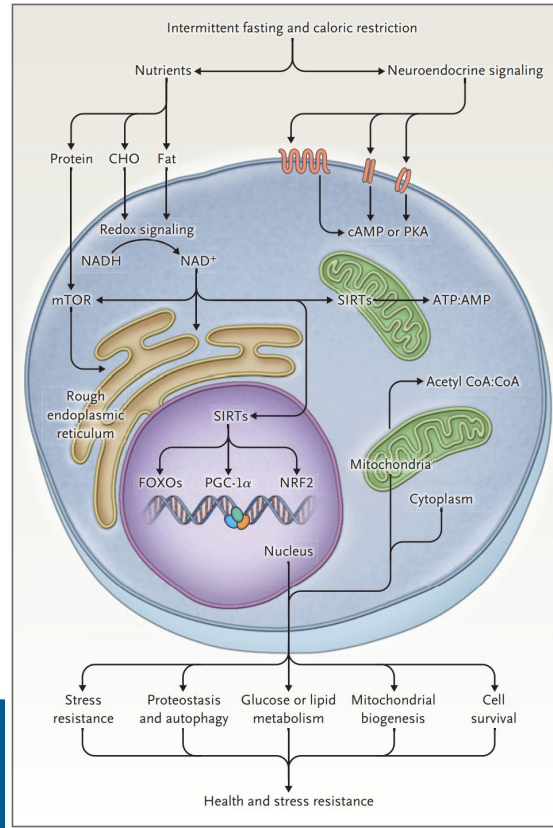


WHAT DOES THE SCIENCE SAY?



- Intermittent Fasting has been shown to activate a number of cellular responses in animal models
 - Pathways that may enhance intrinsic defenses against oxidative and metabolic stress
 - May also remove or repair damaged molecules
- Lead to ketosis and ketone body production which may play a role in activating these pathways

WHAT DOES THE SCIENCE SAY?



- Aging?
 - We know calorie restriction in animals can increase life span
 - Varies based on sex, diet, age, and genetics
 - Not clear if fasting itself helps with lifespan - may be due to calorie restriction in general

WEIGHT-LOSS...

SYSTEMATIC REVIEW

Intermittent fasting interventions for treatment of overweight and obesity in adults: a systematic review and meta-analysis

Leanne Harris¹ • Sharon Hamilton^{2,3} • Liane B. Azevedo^{2,3} • Joan Olajide^{2,3} • Caroline De Brún^{2,3} • Gillian Waller^{2,3} • Vicki Whittaker^{2,3} • Tracey Sharp⁴ • Mike Lean¹ • Catherine Hankey^{1,*} • Louisa Ells^{1,3,*}

¹College of Medical, Veterinary and Life Sciences, University of Glasgow, Glasgow, United Kingdom, ²Health and Social Care Institute, Teesside University, Middlesbrough, United Kingdom, ³Teesside Centre for Evidence Informed Practice: a Joanna Briggs Institute Centre of Excellence, United Kingdom, and ⁴Independent Public Health Consultant, United Kingdom

ABSTRACT

Objective: To examine the effectiveness of intermittent energy restriction in the treatment for overweight and obesity in adults, when compared to usual care treatment or no treatment.

Introduction: Intermittent energy restriction encompasses dietary approaches including intermittent fasting, alternate day fasting, and fasting for two days per week. Despite the recent popularity of intermittent energy restriction and associated weight loss claims, the supporting evidence base is limited.

Inclusion criteria: This review included overweight or obese (BMI ≥ 25 kg/m²) adults (≥ 18 years). Intermittent energy restriction was defined as consumption of ≤ 300 kcal on at least one day, but no more than six days per week. Intermittent energy restriction interventions were compared to no treatment (*ad libitum* diet) or usual care



b2.

WEIGHT-LOSS...COMPARED TO NO DIET

SYSTEMATIC REVIEW

L. Harris *et al.*

Reference	Mean difference (95% CI)
Bhutani <i>et al.</i> ²²	-3.00 (-4.88 to -1.19)
Varady <i>et al.</i> ²⁶	-5.20 (-6.88 to -3.52)
Pooled estimate (random effect)	-4.14 (-6.30 to -1.99)

Tests for heterogeneity: $p = 0.09$,
 $I^2 = 65.7\%$, $T^2 = 1.6$

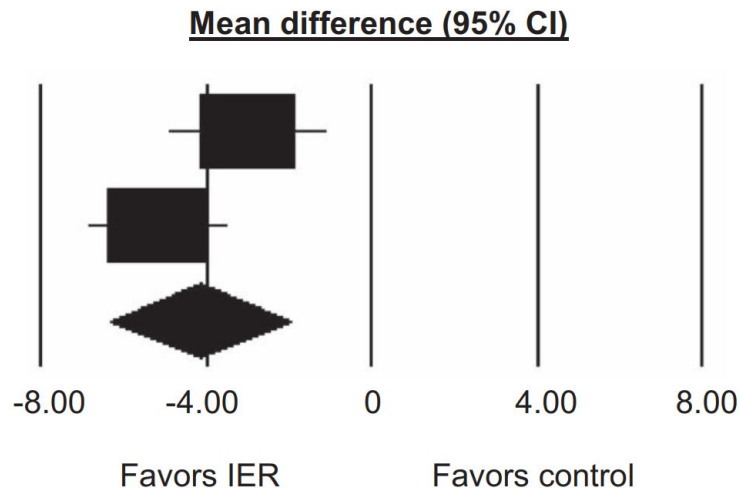


Figure 3: Weighted mean difference in body weight (kg) between the intermittent energy restriction (IER) interventions and control interventions (CI: confidence interval)



WEIGHT-LOSS...COMPARED TO CALORIE RESTRICTION

Reference	Intermittent energy restriction (IER)		Continuous energy restriction (CER)		Mean difference (95% CI)
	Mean (SD)	N	Mean (SD)	N	
Harvie <i>et al.</i> ¹⁹	-5.70 (5.00)	42	-4.50 (6.40)	47	-1.20 (-3.61 to 1.21)
Harvie <i>et al.</i> ²⁰	-5.30 (5.29)	75	-3.80 (5.95)	40	-1.50 (-3.62 to 0.62)
Hill <i>et al.</i> ²¹	-7.20 (10.10)	14	-9.50 (8.70)	9	2.30 (-5.73 to 10.33)
Viegener <i>et al.</i> ²⁵	-8.98 (6.73)	30	-8.96 (7.27)	30	-0.02 (-3.57 to 3.53)
Pooled estimate (Random effect)		161		126	-1.03 (-2.46 to 0.40)

Tests for heterogeneity: $p = 0.76$, $I^2 = 0.0\%$, $T^2 = 0.0$

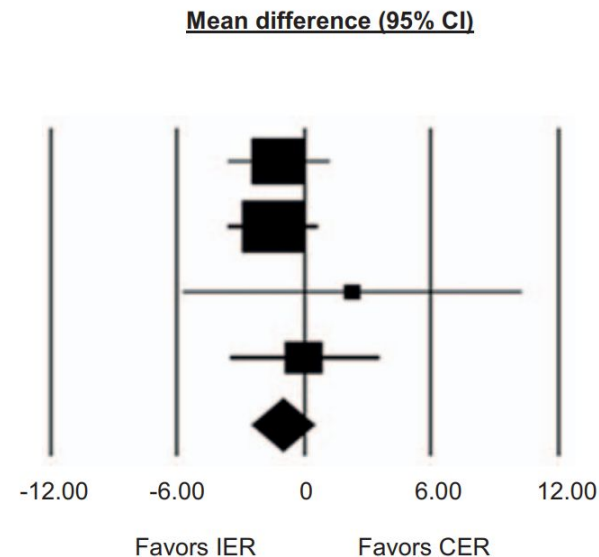
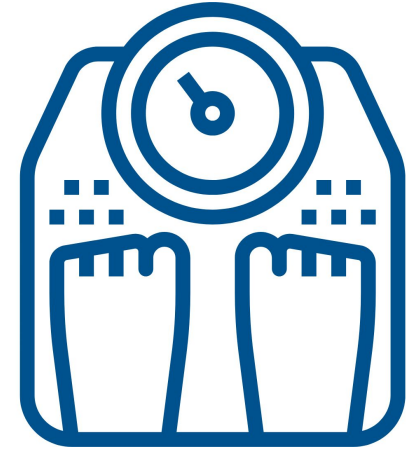


Figure 2: Weighted mean difference in body weight (kg) between the intermittent energy restriction interventions and continuous energy restriction interventions (SD: standard deviation; CI: confidence interval)

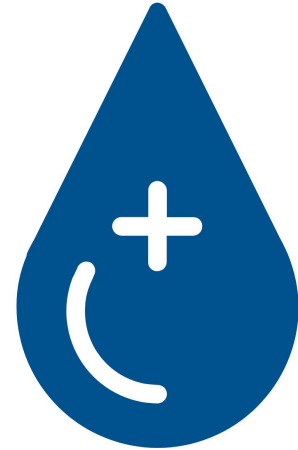
WEIGHT-LOSS SUMMARY

- Can be certainly be a method for supporting weight-loss, however it does not seem to be more effective than continuous energy restriction (creating a daily calorie deficit)
 - Social media health claim: There is a greater loss of fat mass and preservation of fat-free mass (i.e. muscle tissue) - this has yet to be demonstrated in the literature
 - Protein content seems more important vs. pattern of energy restriction
- Greater decrease in waist circumference by ~2-3cm
 - Possible indication of reduced abdominal fat
- Unclear if one method of fasting is better than another
 - Most studied is a modified alternate day fasting (fasting days there is a 70% calorie restriction)



DIABETES, INSULIN RESISTANCE, AND BLOOD SUGAR

- Data has been variable in this regard
 - Studies have seen a decrease in insulin levels and insulin resistance
 - However, this has not translated to a significant effect on blood sugar or A1C levels
 - Not clear if benefit due to IF, calorie restriction, or weight-loss
 - Benefits no longer apparent when the IF intervention is stopped
- A lot of unanswered questions in this regard - overall too much variability to draw specific conclusions whether there is benefit or not



Cochrane Database Syst. Rev. (2021) doi:10.1002/14651858.cd013496.pub2.
Ageing Research Reviews vol. 39 46–58 (2017).
JBI database Syst. Rev. Implement. reports **16**, 507–547 (2018).
Nutrients **13**, 221 (2021).

CHOLESTEROL AND LIPIDS


- Data showing a reduction in TOTAL Cholesterol
- Overall no significant changes seen in regards to LDL and TGs
 - These lipids are linked to cardiovascular disease
 - Greater benefit if your baseline lipids are already elevated?



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Nutrients **13**, 221 (2021).

OTHER FINDINGS...

- Reductions in cardiometabolic markers BUT no data to show a reduction in cardiovascular events/diseases such as heart attacks, and strokes
- No significant benefit in reducing inflammatory markers
 - But maybe reduces oxidative stress?
- Number of groups looking at IF effects in cancer therapy and prevention - as of right now there is no good conclusive evidence to show benefit
- Alzheimer's, Parkinson's, and other neurological disorders - not enough data
 - Again animal models have seen benefit, and markers of the diseases are decreased but it has not been replicated in humans
- Reduced appetite and desire to eat?



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Cell Metab. **27**, 1212-1221.e3 (2018).

SPECIAL MENTION FOR TIME-RESTRICTED EATING



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Early Time-Restricted Feeding Improves Insulin Sensitivity, Blood Pressure, and Oxidative Stress Even Without Weight Loss in Men with Prediabetes

Elizabeth F. Sutton, PhD¹, Robbie Beyl, PhD¹, Kate S. Early, PhD², William T. Cefalu, MD^{1,3}, Eric Ravussin, PhD¹, and Courtney M. Peterson, PhD^{1,4,5}

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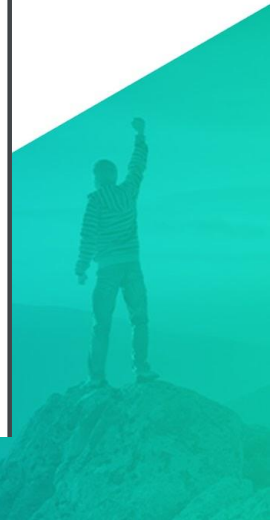
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WHAT WE KNOW?

- Shift workers have increased of mortality and morbidity
- Benefits of IF seemed to be primarily linked to weight-loss
- When TRF is restricted to afternoon and evenings may worsen BG levels, BP, and lipids
- Remember our Circadian System?
 - Regulates sugar, lipid, and energy metabolism
 - Upregulates and downregulates these systems at different times of day
 - Human metabolism seems to be optimized for food intake earlier in the day and during daylight hours...



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Cell Metab. **27**, 1212-1221.e3 (2018).

SUTTON ET AL.

- First supervised controlled feeding trial with Early TRF
 - Five week, randomized, crossover design with a 7 week washout period
 - TRF Group = 6-hour daily eating window and finished eating by 3pm
 - Control Group = 12-hour eating period
- Only ate food provided by staff and ate their food while supervised
 - Provided enough food MAINTAIN their weight
- Study included 8 prediabetic men



Objectives:

- 1) Can TRF improve cardiometabolic markers?
- 2) Determine if TRF has a benefit independent of weight-loss and food intake?

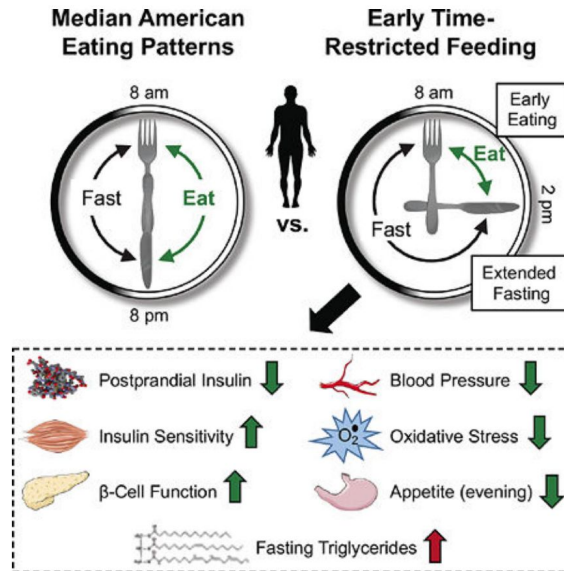


SUTTON ET AL.

Sutton et al.

Page 2

Sutton et al. conduct the first supervised controlled feeding trial to test whether intermittent fasting has benefits in humans in the absence of weight loss. Prediabetic men following a form of intermittent fasting called early time-restricted feeding improved their insulin sensitivity, blood pressure, and oxidative stress levels, without losing weight.



SUTTON ET AL.

- **No significant weight-loss or weight difference was noted between the two groups**
- **IF has no special weight-loss properties - you still need to achieve a calorie deficit for weight-loss to occur**



WHAT DOES THIS ALL MEAN?!

- Do we need to start eating breakfast and consume all of our calories earlier in the day?!
- As well does this mean the diet myth about no longer eating past a certain time in the evening is TRUE?!

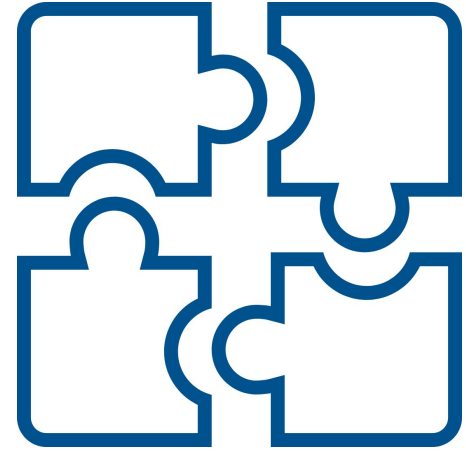
DEPENDS:

- Again this study showed a change in surrogate markers it does not mean it translates to actual events occurring or not occurring if you restrict your feeding window to earlier in the day
- This strategy might be more relevant for those that currently have components of metabolic syndrome - i.e. insulin resistance, increased BP, etc.
- Our knowledge of how our circadian system affects our health is growing and this study adds to the knowledge
 - MORE DATA IS NEEDED



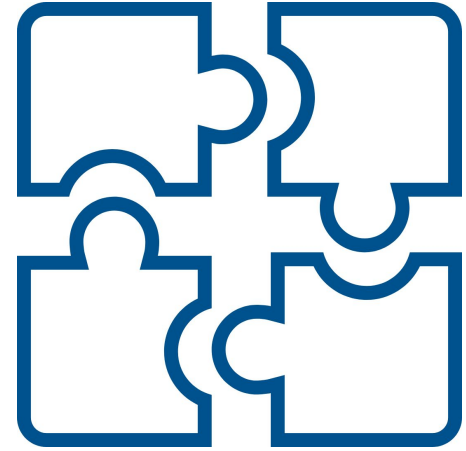
CONCLUSIONS

- Can be effective for weight-loss, but no better than other diets/regimens
- We do see a change in a number of health markers **HOWEVER** that does mean there is true benefit
 - In my opinion many of the health claims are overstated and grossly over extrapolated from animal models and data
- Adherence
 - High drop-out or attrition rates ~30-60% in the studies -
Note: <20% drop-out rate is considered acceptable
 - Needs to be sustainable long-term to receive benefit?



CONCLUSIONS (CONTINUED)

- Practicality
 - Physically demanding job?
 - Does it fit into your life? Spending quality time with loved ones is also a part of health and sharing meals is a part of that
- Side Effects - Especially when Starting
 - Nausea, vomiting, headaches, dizziness, increased thirst, constipation, diarrhea
- Early TRF with a feeding window of 10-12 hours
 - most reasonable and beneficial?



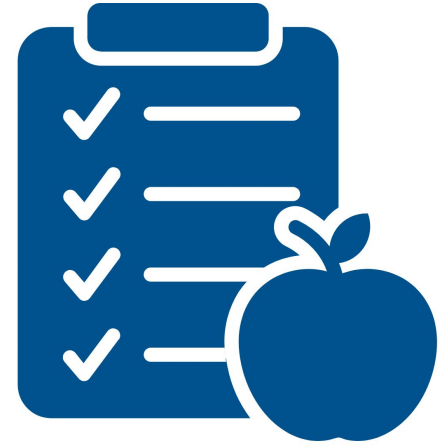
CONCLUSIONS - SAFETY

- Eating Disorders
 - Fasting for long periods of time and then 'feeding' can certainly worsen binge and purging behaviours
 - IF has been linked to causing and worsening disorder eating patterns
 - AVOID if you have a poor relationship with food or a history of disordered eating
- Medical Conditions
 - i.e. Diabetes, electrolyte abnormalities
 - ALWAYS consult your healthcare provider prior to starting any new diet or program



CONCLUSIONS

- Overall keep it simple - stop over complicating the process
- Small changes that you can SUSTAIN are what is most important
- Managing your health isn't a short term process it is something we need to focus on for life
- Collect the data, analyze, find patterns, make changes, AND repeat..



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Insulin Resistance and Weight Management

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Let's connect!

Where to find me:



Channel: Dr. Dan - Weight-loss via Habit Mastery



Page: Dr. Dan - Healthcare Evolution (@theofficialdrdan)

Group: HE Family with Dr. Dan



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THANK YOU!
ANY QUESTIONS?



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FOUNDER OF HEALTHCARE EVOLUTION

EMPOWERING AS MANY PEOPLE AS POSSIBLE TO LIVE A HAPPIER AND HEALTHIER LIFE!