Thank you for joining!

We will begin in just a few minutes

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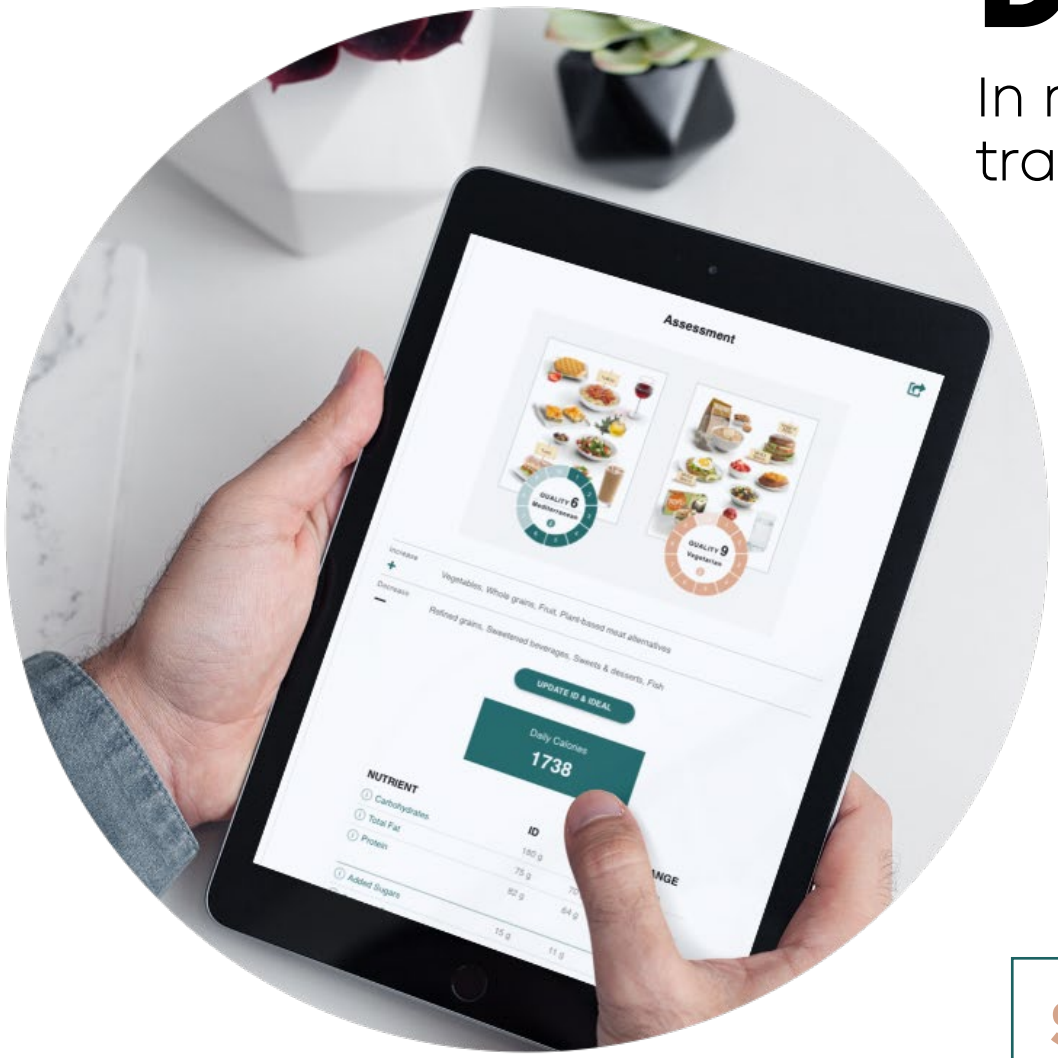

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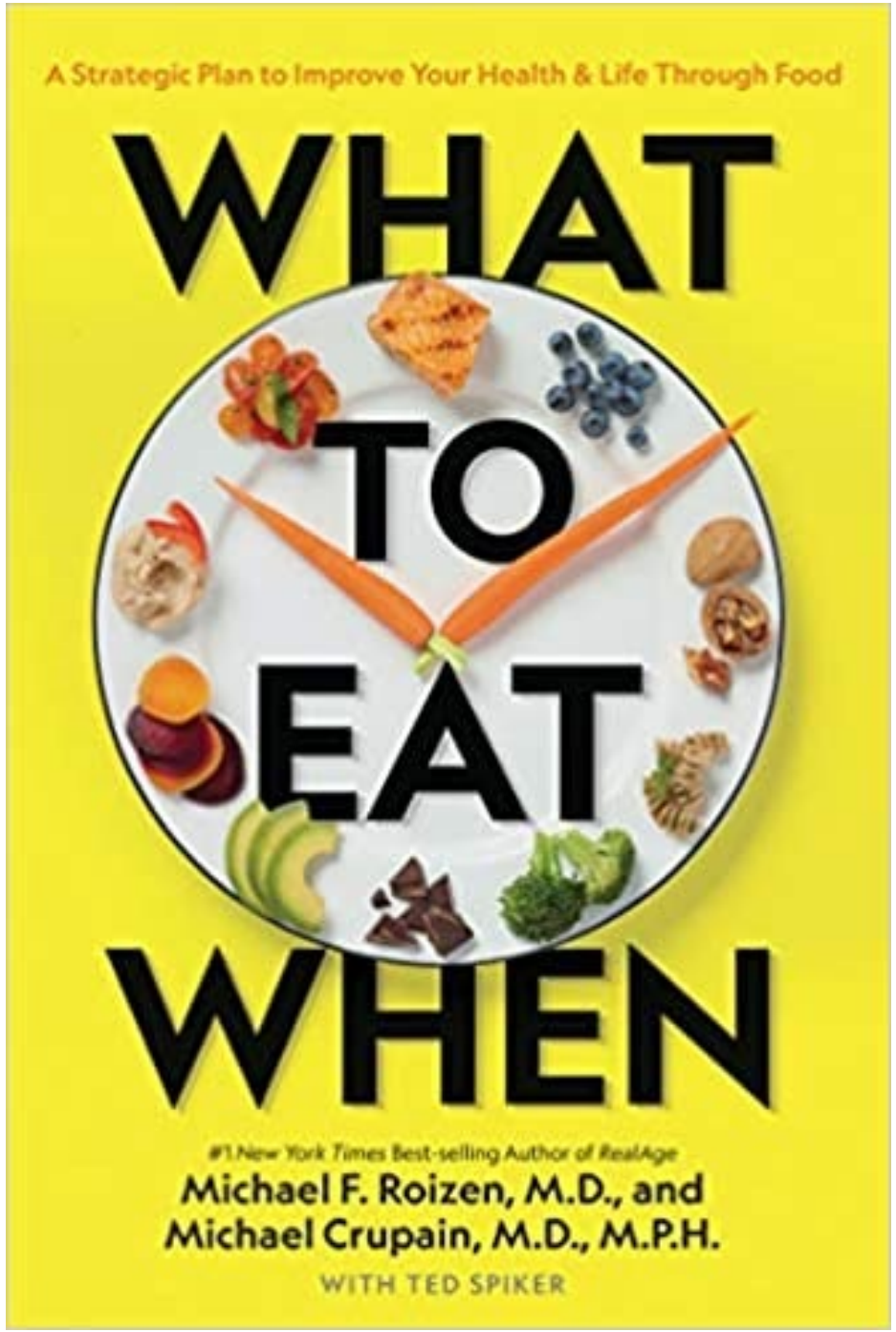

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Intermittent Fasting… And Beyond!

Of Eating, Not Eating, Timing, & Metabolism

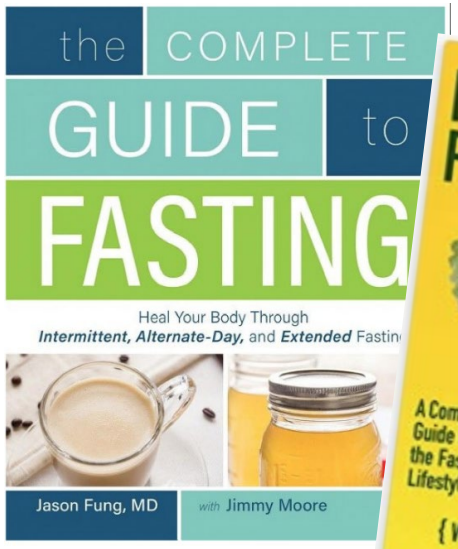
David L. Katz, MD, MPH
CEO, Diet ID, President, True Health Initiative

Michael Crupain, MD, MPH
Chief Medical Officer, Sharecare
Medical Unit Chief of Staff, "The Dr. Oz Show"

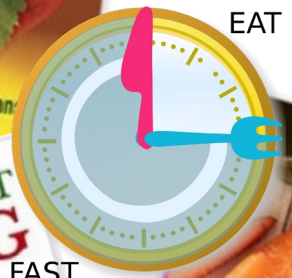
Michael Roizen, MD
Chief Wellness Officer, Cleveland Clinic
Developer of the RealAge Concept

March 24, 2020

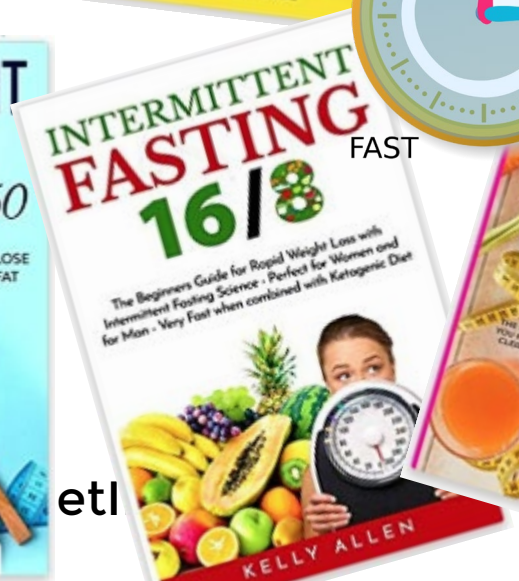
Everyone has an opinion



EAT



FAST



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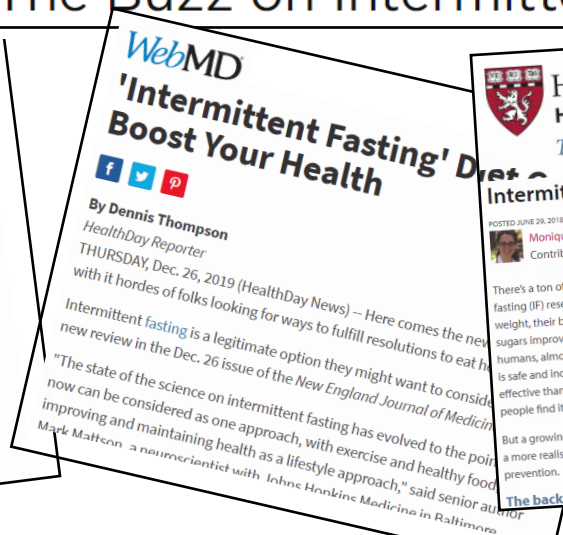

What does the science say?

Effects of **Intermittent Fasting** on Health, Aging, and Disease.
de Cabo R, Mattson MP.
N Engl J Med. 2019 Dec 26;381(26):2541-2551. doi: 10.1056/NEJMra1905136.

Effects of **intermittent fasting** on body composition and clinical health markers in humans.
Tinsley GM, La Bounty PM.
Nutr Rev. 2015 Oct;73(10):661-74. doi: 10.1093/nutrit/nuv041. Epub 2015 Sep 15.
PMID: 26374764 Review.
Intermittent fasting protocols can be grouped into alternate-day **fasting**, whole-day **fasting**, and time-restricted feeding. Alternate-day **fasting** trials of 3 to 12 weeks in duration appear to be effective at
weight (≈3%-7%), body fat (≈3-5.5 kg), total cholesterol (≈10%-21%), and triglycerides
normal-weight, overweight, and obese humans. ...Future studies should examine long-
intermittent fasting and the potential synergistic effects of combining **intermittent**
xercise....

Metabolic Effects of **Intermittent Fasting**.
Patterson RE, Sears DD.
Annu Rev Nutr. 2017 Aug 21;37:371-393. doi: 10.1146/annurev-nutr-071816-064634. Epub 2017 Jul 17.
PMID: 28715993 Review.
The objective of this review is to provide an o
evidence on the health benefits of **intermitte**
intermittent fasting might lead to improved
PubMed and the terms "**intermittent fasting**

Effects of **intermittent fasting** on glucose and lipid metabolism.
Antoni R, Johnston KL, Collins AL, Robertson MD.
Proc Nutr Soc. 2017 Aug;76(3):361-368. doi: 10.1017/S0029665116002986. Epub 2017 Jan 16.
PMID: 28091348 Review.
Two **intermittent fasting** variants, **intermittent** energy restriction (IER) and time-restricted feeding (TRF), have received considerable interest as strategies for weight-management and/or improvi
metabolic health. ...Ultimately, much remains to be learned about **intermittent fasting** (in its v
forms); however, the findings to date serve to highlight promising avenues for future research...

Impact of **intermittent fasting** on the lipid profile: Assessment associated with diet and weight loss.
Santos HO, Macedo RCO.
Clin Nutr ESPEN. 2018 Apr;24:14-21. doi: 10.1016/j.clnesp.2018.01.002.
PMID: 29576352 Review.
Intermittent fasting, whose proposed benefits include the improvement of lipid profile and the body weight loss, has gained considerable scientific and popular repercussion. ...However, the majority of studies that analyze the **intermittent fasting** impacts on the lipid profile and body weight loss are
ks large sample and detailed information about diet.

Impact of **intermittent fasting** on health and disease processes.
Mattson MP, Longo VD, Harvie M.
Ageing Res Rev. 2017 Oct;39:46-58. doi: 10.1016/j.arr.2016.10.005. Epub 2016 Oct 31.
PMID: 27810402 Free PMC article. Review.
Intermittent fasting (IF) encompasses eating patterns in which ind
(e.g., 16-48h) with little or no energy intake, with intervening perio
recurring basis. We use the term periodic **fasting** (PF) to refer to IF
mimicking diets lasting from 2 to as many as 21 or more days. ...

The role of low-calorie diets and **intermittent fasting** in the treatment of obesity and type-2 diabetes.
Zubrzycki A, Cierpka-Kmiec K, Kmiec Z, Wronska A.
J Physiol Pharmacol. 2018 Oct;69(5). doi: 10.26402/jpp.2018.5.02. Epub 2019 Jan 21.
PMID: 30683819 Free article. Review.
Intermittent fasting (IF) involves caloric restriction for one or several days a week, or every day as the prolongation of the overnight fast. The results of recent clinical trials have shown that LCDs and **intermittent fasting** in patients with obesity (including those with coexisting T2D) can lead to a reduction in body fat mass and metabolic parameter improvements. ...

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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).

Studies in animals and humans have shown that many of the health benefits of intermittent fasting are not simply the result of reduced free-radical production or weight loss.[2-5] Instead, intermittent fasting elicits evolutionarily conserved, adaptive cellular responses that are integrated between and within organs in a manner that improves glucose regulation, increases stress resistance, and suppresses inflammation. During fasting, cells activate pathways that enhance intrinsic defenses against oxidative and metabolic stress and those that remove or repair damaged molecules (Fig. 1).[5] During the feeding period, cells engage in tissue-specific processes of growth and plasticity. However, most people consume three meals a day plus snacks, so intermittent fasting does not occur.[2,6]

Preclinical studies consistently show the robust disease-modifying efficacy of intermittent fasting in animal models on a wide range of chronic disorders, including obesity, diabetes, cardiovascular disease, cancers, and neurodegenerative brain diseases.[3,7-10] Periodic flipping of the metabolic switch not only provides the ketones that are necessary to fuel cells during the fasting period but also elicits highly orchestrated systemic and cellular responses that carry over into the fed state to bolster mental and physical performance, as well as disease resistance.[11,12]

Here, we review studies in animals and humans that have shown how intermittent fasting affects general health indicators and slows or reverses aging and disease processes. First, we describe the most commonly studied intermittent-fasting regimens and the metabolic and cellular responses to intermittent fasting. We then present and discuss findings from preclinical studies and more recent clinical studies that tested intermittent-fasting regimens in healthy persons and in

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 updated on December 26, 2019, at NEJM.org.

N Engl J Med 2019;381:2541-51.
DOI: 10.1056/NEJMra1905136

> "It remains to be determined whether people can maintain intermittent fasting for years and potentially accrue the benefits seen in animal models. Furthermore, clinical studies have focused mainly on overweight young and middleage adults, and we cannot generalize to other age groups the benefits and safety of intermittent fasting that have been observed in these studies."

Types of IF

- The 16/8 method
  - fasting for 16 hours daily, keeping the eating window to 8 hours daily
- The 5/2 method
  - eat normally for 5 days, fasting for 2 (or, restrict to 500-600 calories)
- Eat-Stop-Eat
  - do a 24 hour fast 1-2 times per week
- Alternate day fasting: fasting every other day

Strategic Timing

- Metabolic advantage?
- Calorie management?
- Both?

Calories?

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Diet Quality

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QUESTION & ANSWER

Please submit questions via Q/A zoom feature

Thank you for attending!

Next FOOD TRUTHS Webinar is March 20th.
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