

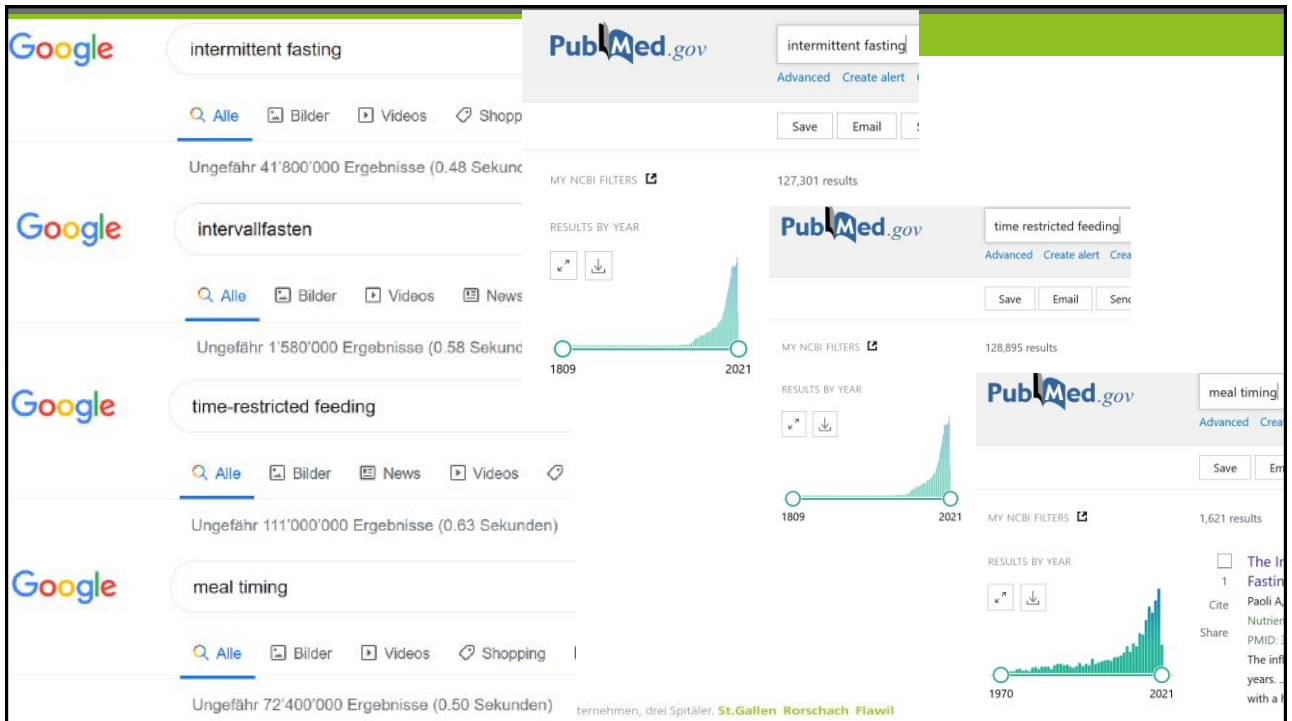
GESKES-Fortbildungsnachmittag 29. April 2021

Meal timing, intermittierendes Fasten



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The screenshot displays a search engine interface with four search queries and their corresponding PubMed results:

- intermittent fasting:** Approximately 41,800,000 results (0.48 seconds). PubMed shows 127,301 results.
- intervallfasten:** Approximately 1,580,000 results (0.58 seconds). PubMed shows 128,895 results.
- time-restricted feeding:** Approximately 111,000,000 results (0.63 seconds). PubMed shows 1,621 results.
- meal timing:** Approximately 72,400,000 results (0.50 seconds). PubMed shows 1,621 results.

Each PubMed result includes a 'RESULTS BY YEAR' chart showing a significant increase in publications starting around 2010 and continuing through 2021. The chart for 'meal timing' shows a particularly sharp rise starting around 2015.

Isokalorisches Fasten vs. Kalorienrestriktion

Intervall-Fasten = intermittierendes Fasten

→ tage- oder stundenweises Verzichten auf Nahrung

Alternate day fasting

- **Fasten jeden 2. Tag**
- an Fastentagen 0-25 % der üblichen Energiemenge



Modified fasting regimens

- **2-Tage-Diät:** innerhalb 1 Woche an 2 aufeinanderfolgenden Tagen max. 650 kcal
- **5:2-Diät (Fast Diet):** 2 Fastentage pro Woche mit ca. ¼ der sonst üblichen Energiezufuhr

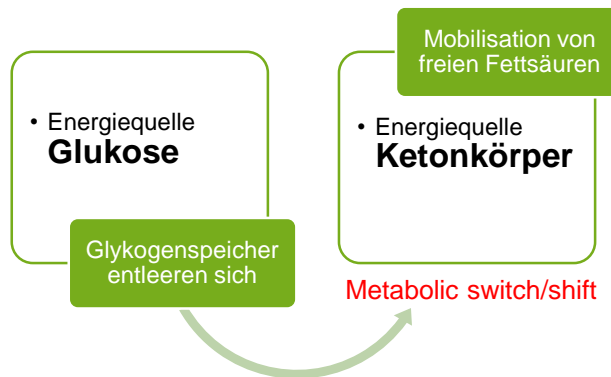


Time-restricted feeding

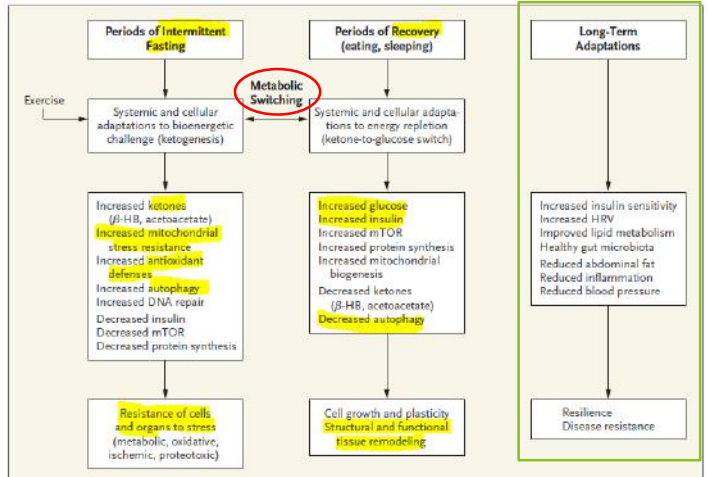
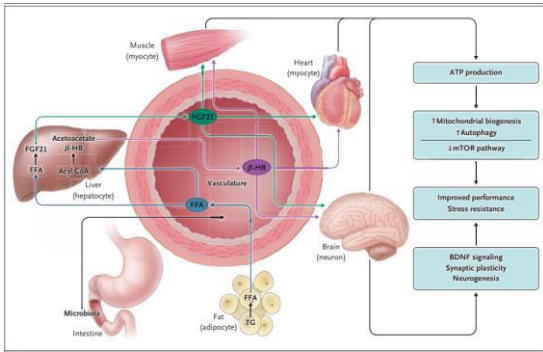
- **16:8-Fasten:** 16 Std. Fasten (FS od. AE weglassen), 8 Std. normal essen
- **Dinner-Cancelling:** Essenspause von mind. 14 Std. bis zum Frühstück



Hintergrund – Effekte des Fastens



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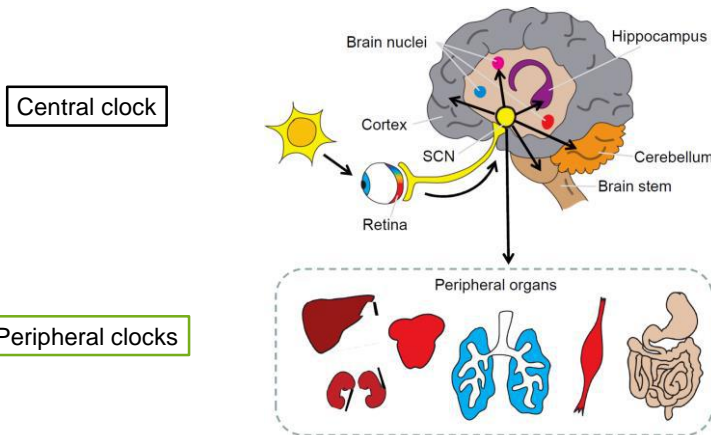


De Cabo, NEJM 2019

Kantonsspital St.Gallen – ein Unternehmen, drei Spitäler: St.Gallen Rorschach Flawil

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Hintergrund – Chronobiologie, zirkadiane Rhythmen



SCN = suprachiasmatic nucleus
Brain nuclei: u.a. Amygdala

Kondratova, Nat Rev Neurosci 2013

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Intermittierendes Fasten

Wake/feeding	
Liver	Glycogen, cholesterol, and bile acid synthesis
Pancreas	Insulin secretion
Fat	Lipogenesis, adiponectin production
Muscle	Glycolytic metabolism

Sleep/fasting	
Liver	Gluconeogenesis, glycogenolysis, mitochondrial biogenesis
Pancreas	Glucagon secretion
Fat	Lipid catabolism, leptin secretion
Muscle	Oxidative metabolism

Figure 1
Potential mechanisms linking intermittent fasting with obesity, type 2 diabetes (T2D), cardiovascular disease (CVD), and cancer. Figure modified from Reference 79 with permission.

R.E. Patterson, Ann. Rev. Nutr. 2017, 37: 371-393

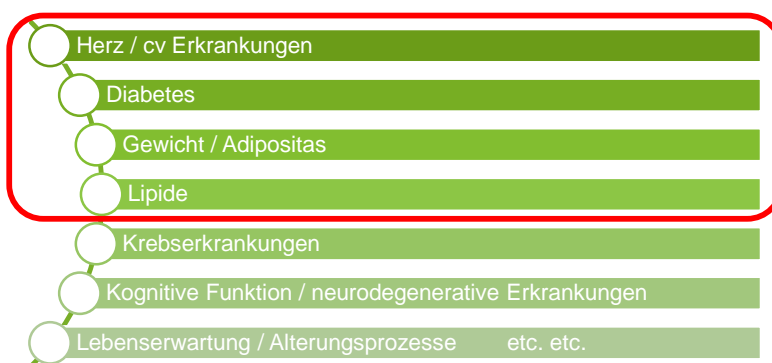
nehmen, drei Spitäler: **St.Gallen Rorschach Flawil**

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M.P. Mattson et al. / Ageing Research Reviews 39 (2017) 46-58

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Evidenz



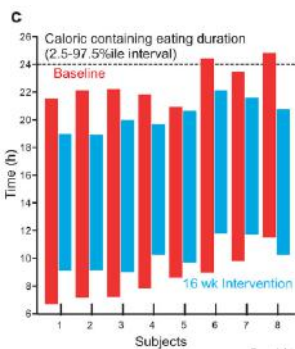
The key questions...

- Welches Fastenregime ist am besten (alternate day fasting, modified fasting, time-restricted eating) ?
- Welche Patienten profitieren von welchem Regime ?
- Kann intermittierendes Fasten auch präventiv einen Nutzen haben ?

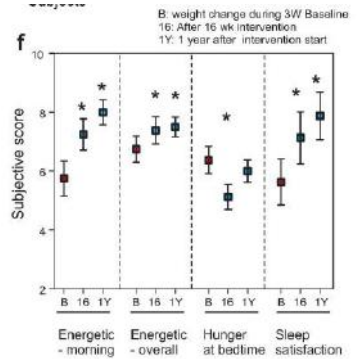
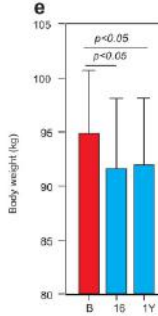
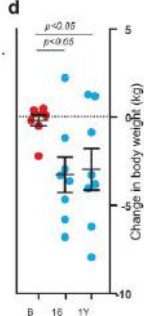
➤ Time-restricted feeding
➤ Gesunde

Gill et al., Cell Metabolism 2015; 22: A smartphone app reveals erratic diurnal eating patterns in humans that can be modulated for health benefits

- 8 erwachsene Probanden, Zeitspanne der Nahrungsaufnahme: 14.5 Std. → 10 Std.
- Keine Instruktionen hinsichtlich Menge, Zusammensetzung, Kaloriengehalt der Nahrung



Nach 16 Wo -3.27kg (3.4% des KG)



➤ Time-restricted feeding
➤ Mahlzeitenfrequenz/-häufigkeit
➤ Adipöse Diabetiker

Jakubowicz et al., Diab Care 2019; 42:

- 28 freiwillige Diabetiker (BMI 32, HbA1c 8.1%, 68 J., 2/3 Männer)
- Seit ca. 20 J. DM, Insulintherapie seit 7 J. (total ca. 66 E Insulin, davon ca. 2/3 Basisinsulin)
- 3 Mahlzeiten/d (3M) vs. 6 Mahlzeiten/d (6M) mit gleicher totaler Kalorienzufuhr (isokalorisch) über 12 Wochen

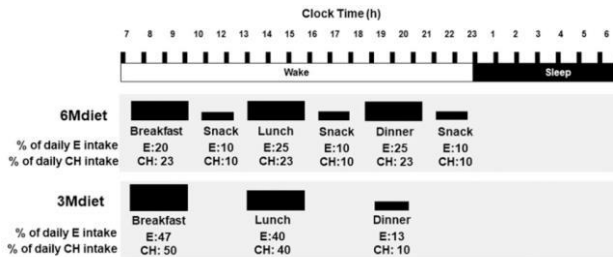


Figure 1—Mealtime and distribution of the 3Mdiet and 6Mdiet. CH, carbohydrates; E, energy.

Jakubowicz et al., Diab Care 2019; 42

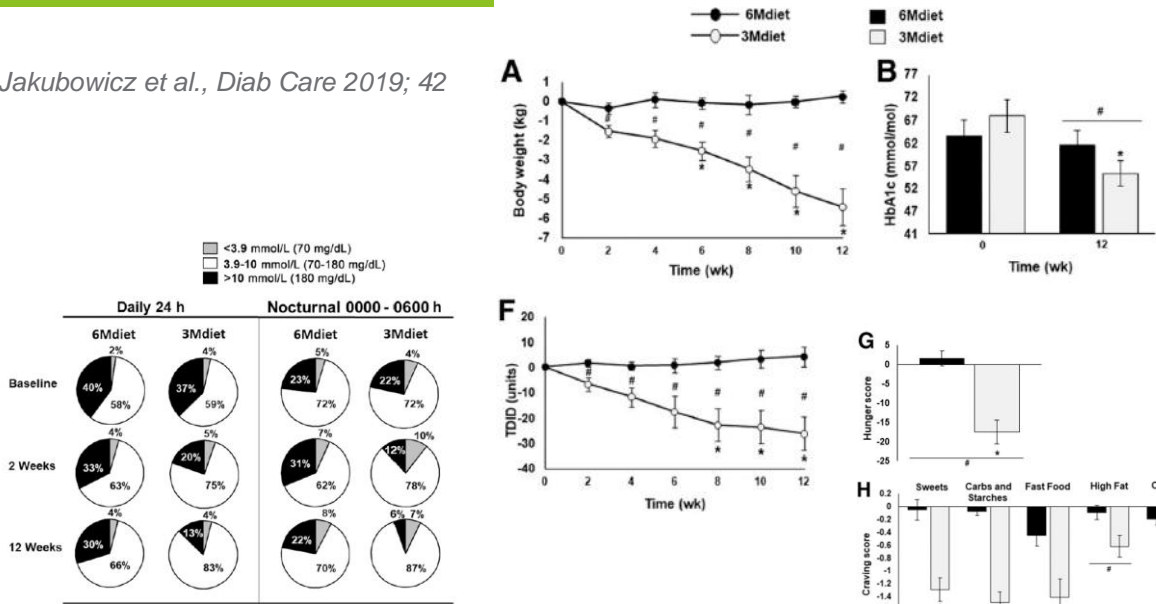


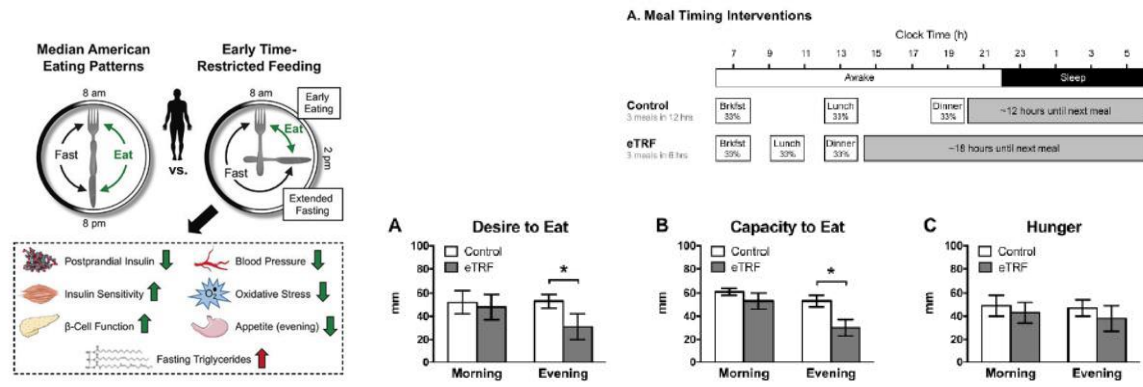
Figure 3—Percentage of daily (24 h) and nocturnal (0000–0600 h) glucose levels in range at baseline, 2 weeks, and 12 weeks of 3Mdiet and 6Mdiet.

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Time-restricted feeding
Prädiabetes

Sutton et al., Cell Metabolism 2018; 27: Early time-restricted feeding improves insulin sensitivity, blood pressure and oxidative stress even without weight loss in men with prediabetes

- 5 Wochen, randomisiert crossover, 8/12 Teilnehmer schlossen Studie ab



Kantonsspital St.Gallen – ein Unternehmen, drei Spitäler: St.Gallen Rorschach Flawil

➤ Time-restricted feeding
➤ Skipping breakfast
➤ Gesunde

Cahill et al., Circulation 2013; 128: Prospective study of breakfast eating and incident coronary heart disease in a cohort of male US health professionals

- Rund 27'000 Männer (45-82 J., ohne cv und Tumorerkrankungen) aus der Health Professionals Follow-up Study
- Whrd. Follow-up 16 J.: rund 1500 Fälle von KHK-Diagnose

Table 5

Comparison of eating habits and multivariate relative risk (RR) of coronary heart disease (CHD) with 95% confidence intervals (CI) obtained using different methods for approaching missing covariate data.

Risk Factor	Method for Missing Covariate Data		
	Missing Indicator	Multiple Imputation	Complete Case*
Skipping breakfast [†]	1.27 (1.06-1.53)	1.29 (1.07-1.56)	1.25 (1.03-1.51)
Late night eating [‡]	1.55 (1.05-2.29)	1.53 (1.01-2.32)	1.52 (1.01-2.29)
Eating frequency			
1-2 times/day	1.10 (0.91-1.31)	1.17 (0.86-1.58)	1.08 (0.79-1.47)
3 times/day	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)
4-5 times/day	1.05 (0.94-1.18)	1.05 (0.79-1.38)	1.11 (0.84-1.47)
6+ times/day	1.26 (0.90-1.77)	1.21 (0.56-2.61)	1.57 (0.72-3.42)

* There are 97 fewer cases.

[†] The reference group is breakfast eaters.

[‡] The reference group is those who do not eat late at night.

The model is adjusted for age, diet quality (alternate Healthy Eating Index 2010 score), energy intake, alcohol intake, smoking, marital status, full-time work status, parental myocardial infarction <60 years of age, physical exam in last two years, physical activity (MET hours/week), television hours/week, and sleep hours/24 hours.

Kantonsspital St.Gallen

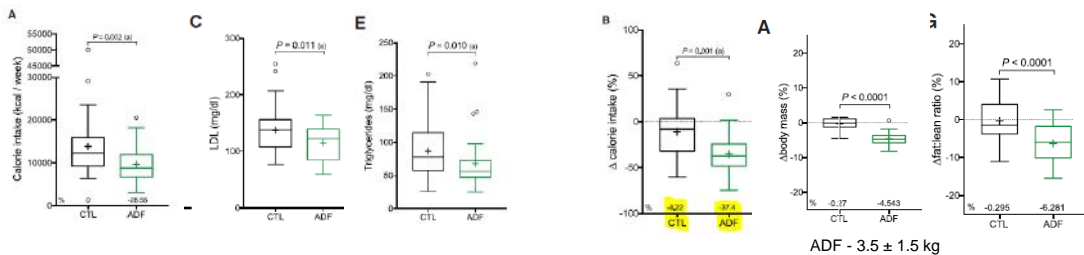
➤ Alternate day fasting
➤ Gesunde, normalgewichtige Probanden

Stekovic et al., Cell Metabolism 2019; 30: Alternate day fasting improves physiological and molecular markers of aging in healthy, non-obese humans

- Prospektive Kohortenstudie mit eingebettetem RCT
- Kohortenstudie: 30 Pers., ADF für mind. 6 Mte., Vgl. mit 60 Kontrollpersonen (CTL)
- RCT: CTL aus Kohortenstudie 1:1 randomisiert zu 4 Wo ADF vs. Kontrollgruppe; unlimitierte Nahrungszufuhr an normalen Tagen, keine feste/flüssige Nahrung und kalorienhaltige Getränke an Fastentagen

PROSPECTIVE LONG-TERM STUDY (>6 MONTHS)
CTL = Control ADF = Alternate Day Fasting

4 WEEKS RANDOMIZED CLINICAL TRIAL
CTL = Control BL = Baseline
ADF = Alternate Day Fasting FU = Follow-Up (4 weeks)



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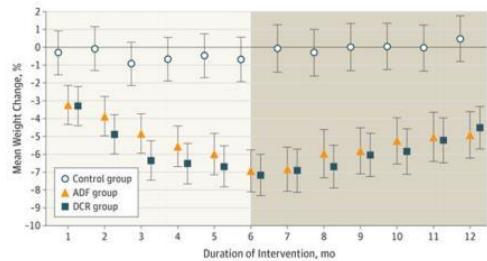
➤ Alternate day fasting
➤ Gesunde, adipöse Probanden

Trepanowski et al., JAMA Intern Med 2017: Effect of alternate day fasting on weight loss, weight maintenance and cardioprotection among metabolically healthy obese adults

- 100 Pat. (86 ♀, 14 ♂, 44 ±11 J., BMI 35 ±4 kg/m², 90% BMI > 30)
- Randomisierung in 3 Gruppen:
 - ADF (Energiezufuhr 25% an Fastentagen, 125% an normalen Tagen)
 - Kont. Kalorienrestriktion (tägl. 75% des Energiebedarfs)
 - Kontrollgruppe
- Follow-up 12 Monate: 6 Monate Gewichtsreduktions-Phase, 6 Monate Gewichtstabilisierung

	Baseline	Nach 6 Mtn.	Nach 12 Mtn.	Dropout
ADF-Gruppe	34	25	21	38 %
CR-Gruppe	35	29	25	29 %
Kontrollgruppe	31	25	23	26 %

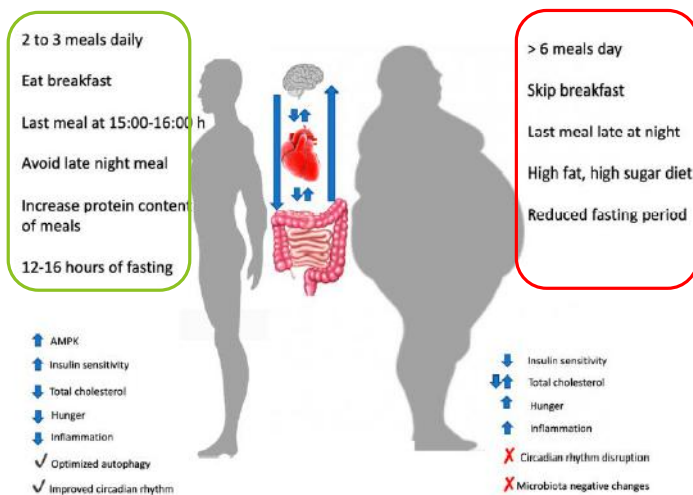
Keine Unterschiede zw. den Interventionsgruppen nach 6 und 12 Mtn. bzgl.:
BD, P, TG, Nüchtern-Glc, Insulin, Insulinresistenz, CRP, Homocystein, FFM



Metaanalysen, systematische Reviews

- Harvie et al.: Potential benefits and harms of intermittent energy restriction and intermittent fasting amongst obese, overweight and normal weight subjects – a narrative review of human and animal evidence, Behav Sci 2017; 7
- Patterson et al.: Metabolic effects of intermittent fasting, Annu. Rev. Nutr. 2017; 37
- Pellegrini et al.: Effects of time-restricted feeding on body weight and metabolism, a systematic review and meta-analysis, Review in Endocrine and Metabolic Disorders 2019
- ➔ Paoli et al.: The influence of meal frequency and timing on health in humans: the role of fasting, Nutrients 2019; 11
- Dong et al.: Intermittent fasting: a heart healthy dietary pattern?, Am J Med 2020; 133(8)

Ergebnisse aus Reviews



Paoli et al, Nutrients 2019

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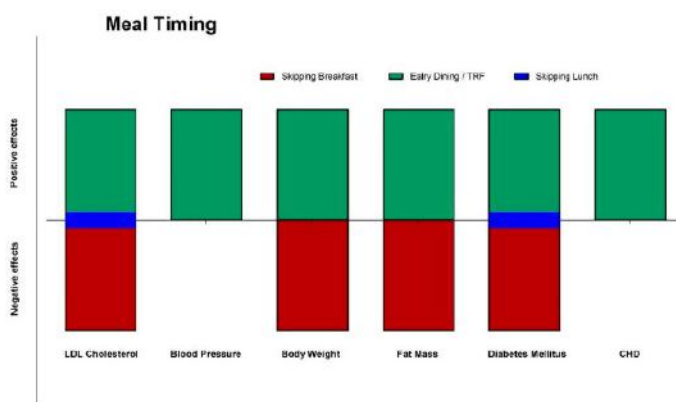


Figure 4. Effects (green: positive; red: negative; blue: neutral) of meal timing on different CVD risks factors and diseases. CHD: coronary heart disease; CVD: cardiovascular disease; TRF: time restricted feeding.

Paoli et al, Nutrients 2019

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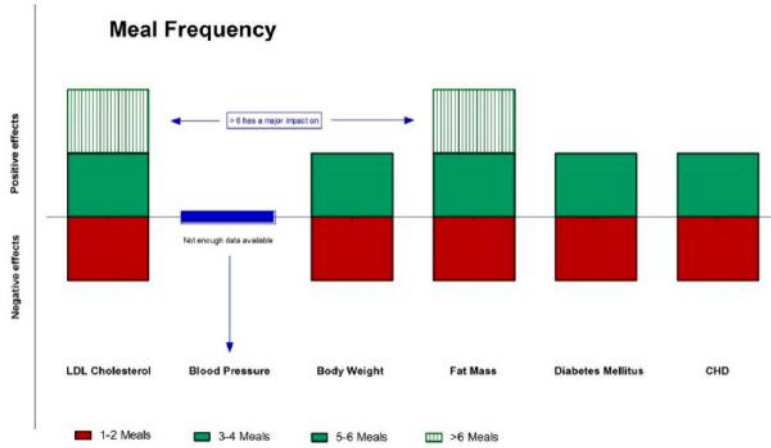


Figure 5. Effects (green: positive; red: negative; blue: neutral) of meal frequency on different CVD risks factors and diseases. CHD: coronary heart disease; CVD: cardiovascular disease.

Paoli et al, Nutrients 2019

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Cochrane Database of Systematic Reviews | Review - Intervention

Intermittent fasting for the prevention of cardiovascular disease

✉ Mohammed Allaf, Hussein Elghazaly, Omer G Mohamed, Mohamed Firas Khan Fareen, Sadia Zaman, Abdul-Majeed Salmasi, Kostas Tsilidis, Abbas Dehghan Authors' declarations of interest

Version published: 29 January 2021 Version history

<https://doi.org/10.1002/14651858.CD013496.pub2>

Authors' conclusions

We are uncertain about the effects of intermittent fasting on clinical events such as mortality, myocardial infarction and heart failure due to lack of data for these outcomes. The individual meta-analyses show that intermittent fasting may be effective in reducing weight when compared to ad libitum feeding and may be as effective as continuous energy restriction. Despite this, these changes appear to be clinically insignificant at short-term follow-up. The quality of the available evidence is low to very low which means that many areas of uncertainty remain. Further research is needed to understand which patient groups would and would not benefit from intermittent fasting (e.g. patients with diabetes or eating disorders) as well as the effect on longer-term outcomes such as all-cause mortality and myocardial infarction.

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Zusammenfassung

... auch wenn die Datenlage noch zu wünschen übrig lässt ...



„Nicht nur was, sondern auch wie und wann“

„Verschnaufpausen“ (Nüchternphasen)



„Morgens wie ein Kaiser, mittags wie ein König, abends wie ein Bettler“



„Weniger ist mehr“ (3-4 Mahlzeiten)

Der Link zur Praxis...

- Verschiedene Fastenregimes können positive Effekte haben → Möglichkeiten, Präferenzen mit dem Patienten besprechen (v.a. Patienten mit Diabetes, Adipositas, evtl. auch in der Prävention)
- Devise: Regime muss mit dem Lebens-, Arbeitsrhythmus des Patienten kompatibel sein und längerfristig aufrechterhalten werden können

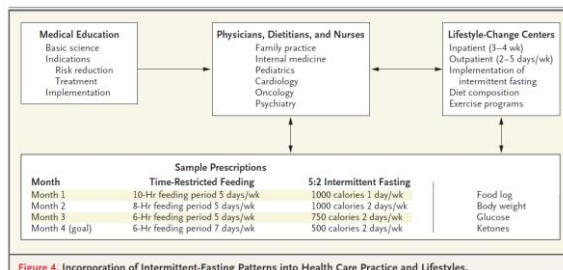


Figure 4. Incorporation of Intermittent-Fasting Patterns into Health Care Practice and Lifestyles.

De Cabo, NEJM 2019

Literatur

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- Mattson et al.: Impact of intermittent fasting on health and disease processes, Ageing Research Reviews 2017; 39
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- Pellegrini et al.: Effects of time-restricted feeding on body weight and metabolism, a systematic review and meta-analysis, Review in Endocrine and Metabolic Disorders 2019
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- Sutton et al.: Early time-restricted feeding improves insulin sensitivity, blood pressure and oxidative stress even without weight loss in men with prediabetes, Cell Metabolism 2018; 27
- Lowe et al.: Effects of time-restricted eating on weight loss and other metabolic parameters in women and men with overweight and obesity (TREAT Randomized Clinical Trial), JAMA Internal Medicine 2020; 180(11)
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- Trepanowski et al.: Effect of alternate day fasting on weight loss, weight maintenance and cardioprotection among metabolically healthy obese adults, JAMA Internal Medicine 2017; 177(7)

Danke !

