

## MDL Update 2025

18.03.2025, Veldhoven

### UPF: Ultra-Processed Food

*Dr. J.W. Kruimel, MDL-arts, MUMC+, Maastricht*

# Disclosures

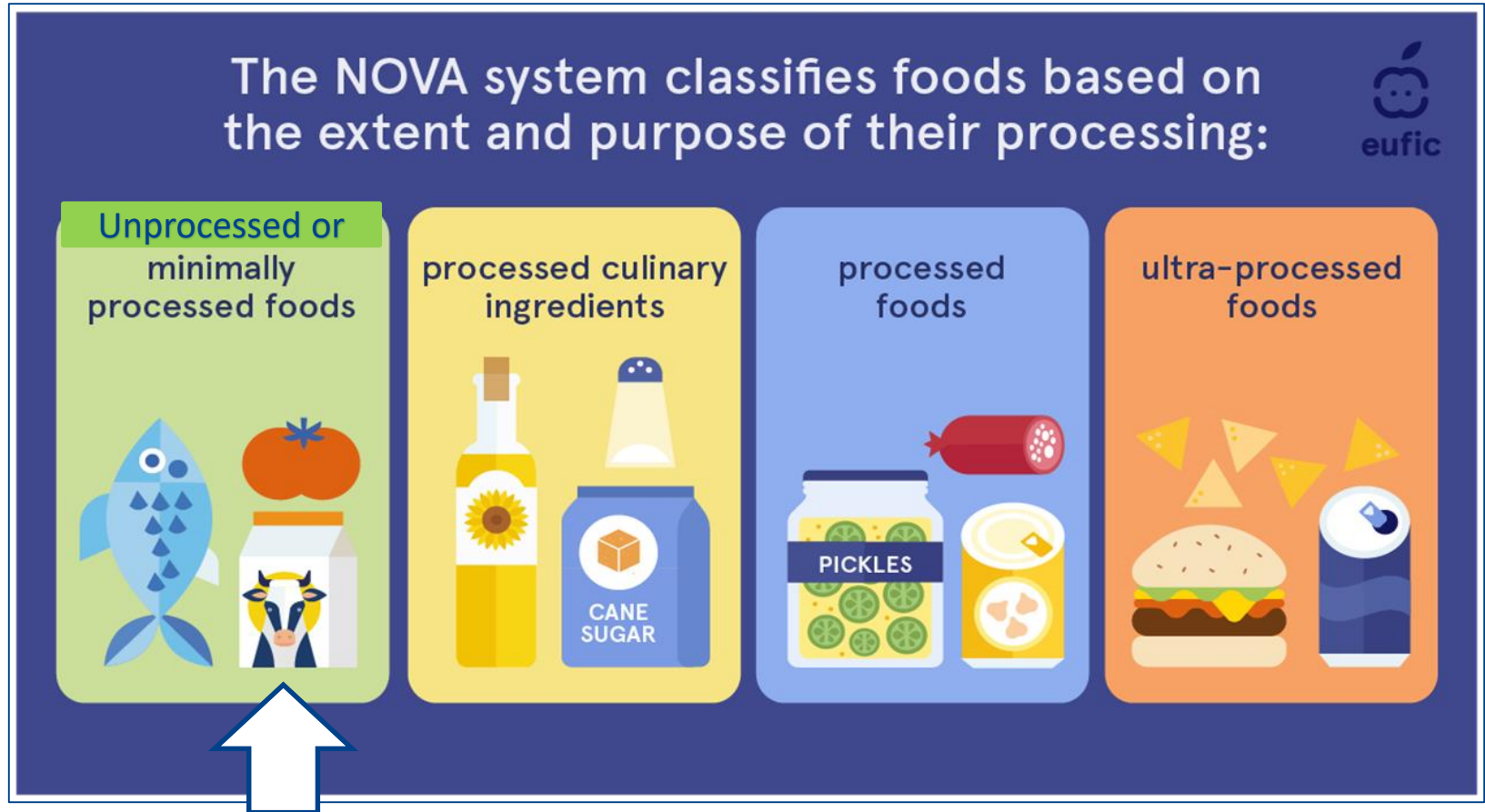
J.W. Kruimel: No disclosures

# Leerdoelen Ultra-Processed Food (UPF)

1. Wat is UPF?
2. Wat is bekend over de gastro-intestinale effecten van UPF?

# NOVA classification system

Monteiro et al. FAO of UN, 2019



# Koken in de 20<sup>e</sup> eeuw: vnl. NOVA groep 1 en 2



# Magere melk vs fruitmelk (UPF)

voedingswaarde per 100 mL

Energie	35 kcal / 147 kJ
Koolhydraten	4.8 g
Waarvan suikers	4.8 g
Eiwitten	3.7 g
Zout	0.12 mg
Calcium	133 mg*
Vitamine B2	0.19 mg **
Vitamine B12	0.47 ug ***



Energie	44 kcal / 187 kJ
Vetten	0 g
Waarvan verzadigde vetzuren	0 g
Koolhydraten	8.2 g
Waarvan suikers	8.1 g
Eiwitten	2.1 g
Zout	0.08 mg
Calcium	67.3 mg*



Ingrediënten: magere melk, water, melkbestanddelen, 10% vruchtensap (appel, 1% aardbei, 1% kers), suiker, natuurlijk aroma, wortelconcentraat, cultures van m.o.(melk)

# Magere melk vs NOT MILK (UPF)

## voedingswaarde per 100 mL

Energie	183 kJ / 44 kcal
Vetten	0,2 g
Verzadigde Vetzuren	0,2 g
Enkelvoudig Onverzadigde Vetzuren	0,6 g
Meervoudig Onverzadigde Vetzuren	1,0 g
Koolhydraten	5,6 g
Suikers	0 g
Vezels	1,0 g
Eiwitten	0,7 g
Zout	0,12 g
Vitaminen	
D	0,75 µg (15%*) 0
Mineralen	
Calcium	120 mg (15%*)



haverbasis (water, haver (8,7%)), zonnebloemolie, chicoreivezel, erwteneiwit, calciumcarbonaat, zuurteregelaar (kaliumfosfaten), natuurlijke aroma's, zeezout, emulgator (lecithinen), stabilisator (gellangom), vitamine (D2)

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# Wat is UPF?

Monteiro et al. FAO of UN, 2019

- UPF's are formulations of **ingredients, mostly of exclusive industrial use, typically created by series of industrial techniques and processes** (hence 'ultra-processed').  
....
- Processes and ingredients used for the manufacture of UPF's are **designed to create highly profitable products** (low-cost ingredients, long shelf-life, powerfully branded):
  - **convenience** (imperishable, ready-to-consume)
  - **hyper-palatability**
  - **transnational corporations** using pervasive **advertising** and promotion  
....
- **Enormous market advantages for UPF's:** liable to displace all other NOVA food groups, and to replace freshly made regular meals and dishes, with snacking any time, anywhere.



# Wat is UPF?

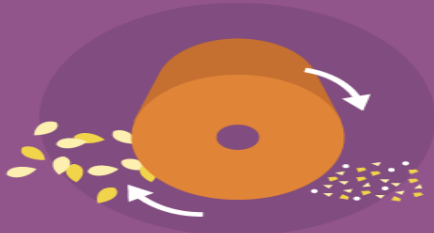
## Chris van Tulleken, 2023

- **If it's wrapped in plastic and has at least one ingredient that you wouldn't usually find in a standard home kitchen**
- N.B. **Almost every food that comes with a health claim** on the packet is a UPF
- Evolutie: voedselvoorziening **“driven by the flow of energy”**
- Laatste 150 jaar: voedselvoorziening **“driven by the flow of money”**

-> invloed op lichaamsfuncties zoals regulatie lichaamsgewicht

# Waarom food processing?

## impact of food processing



making food edible



altering antioxidant levels



making it convenient



tailoring to specific needs



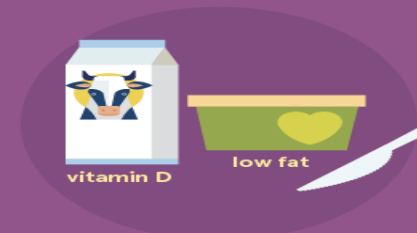
ensuring food safety



increasing diversity



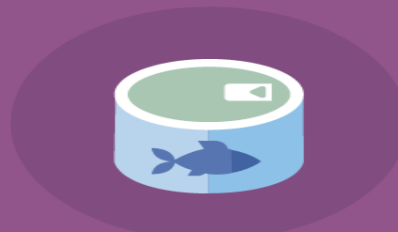
changing flavour & texture



allowing fortification & enrichment



decreasing price



reducing food waste



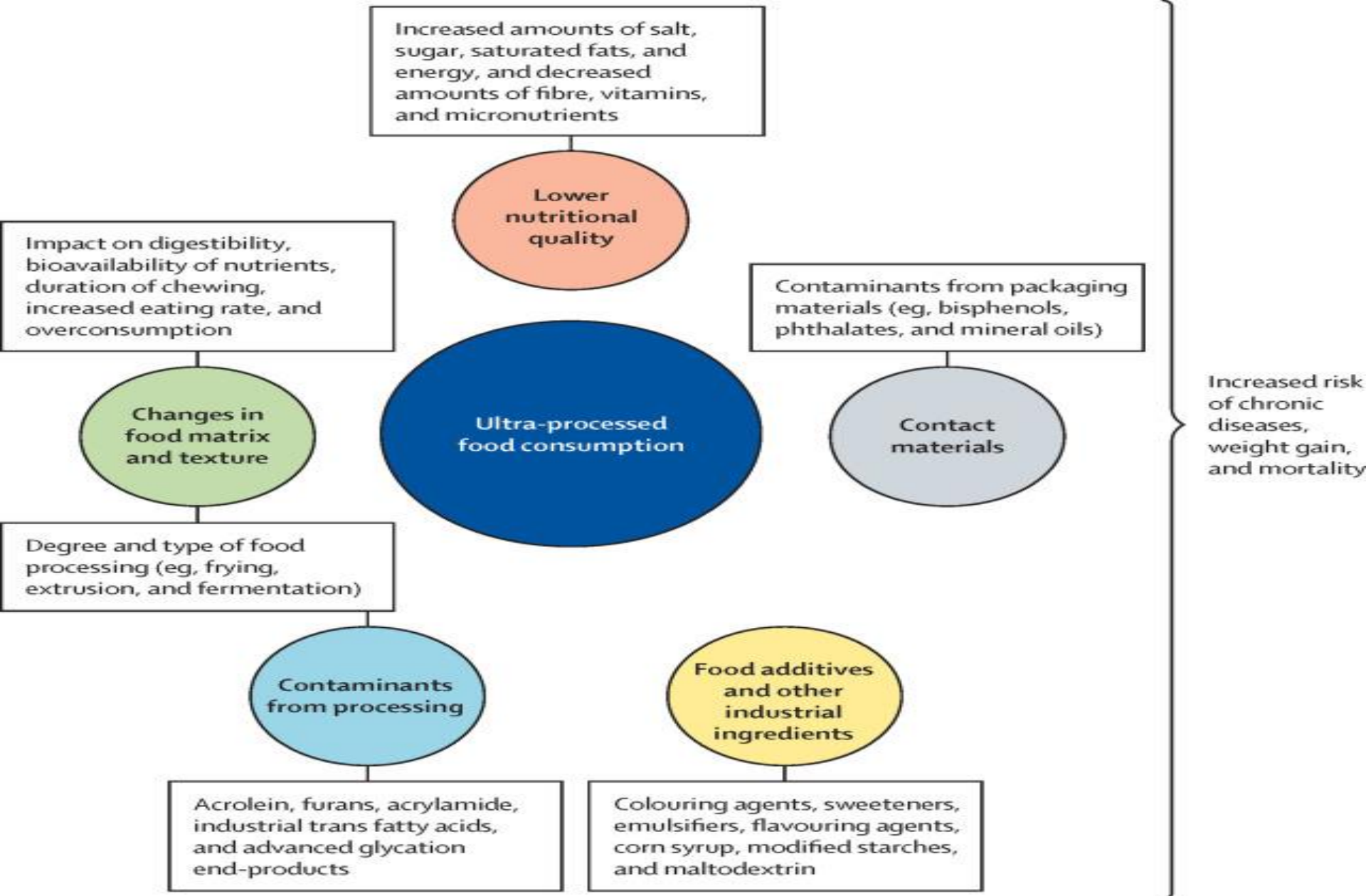
preserving nutritional quality



# Voedselindustrie

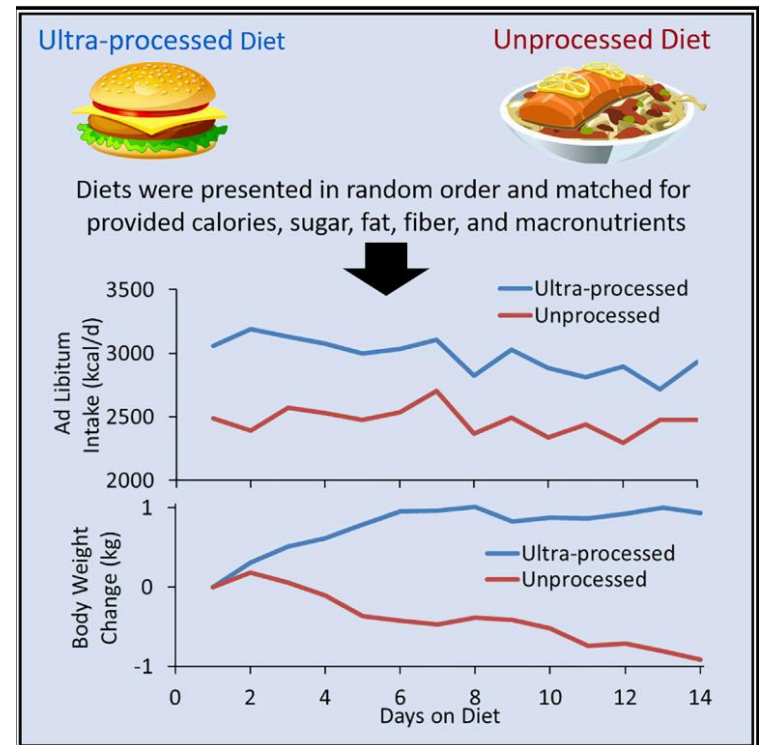
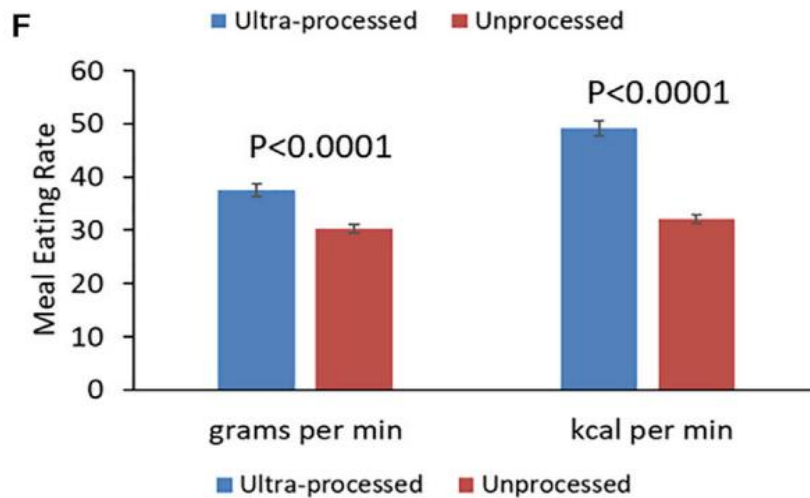
- Vanishing caloric density
- Sonic branding klikpsst
- Stomach share





# Hall et al. Cell Metabolism, 2019

- **20 inpatient adults:** ultra-processed and unprocessed diets for 14 days
- Diets matched for presented calories, energy density, macronutrients, sugar, sodium, and fiber
- Ad libitum intake: **+ 500 kcal/day on ultra-processed vs unprocessed diet**
- Body weight changes highly correlated with diet differences in energy intake (**+0.9 kg vs -0.9 kg, especially fat mass**)

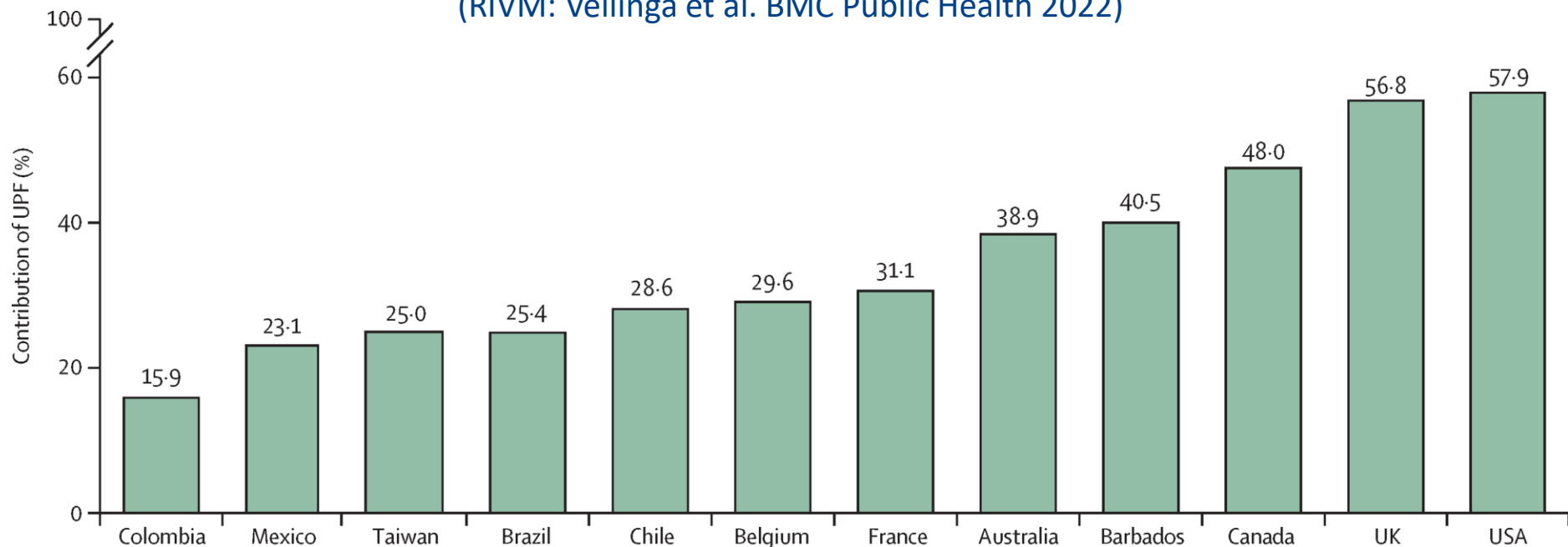


# Contribution of UPF to daily energy intakes in several countries

Srouf et al. Lancet Gastroenterol Hepatol 2022

In the average Dutch diet, per 2000 kcal, ultra-processed foods and drinks (UPFD) covered **29%** (456 g UPF and 437 g UPD) of daily consumption and **61% of energy intake**

(RIVM: Vellinga et al. BMC Public Health 2022)



# Umbrella Review 01.2024

thebmj Visual abstract



## Ultra-processed food exposure and adverse health outcomes



**Summary**  
Lane et al.



Higher dietary exposure to ultra-processed foods was associated with a higher risk of adverse health outcomes in 32 out of 45 pooled analyses (71%)

**Study design**



Umbrella review

14 meta-analysis studies; 45 pooled analyses  
Ultra-processed foods; defined by the Nova classification

**Population**



9 888 373 participants included; irrespective of health status and age

**Outcomes**



See full paper for more parameters, including those with no evidence  
Mortality Cancer Cardiovascular health Gastrointestinal health  
Mental health outcomes Respiratory health Metabolic health

Evidence quality	Evidence credibility			
	Convincing	Highly suggestive	Suggestive	Weak
Moderate	Type 2 diabetes		All cause mortality	Overweight + obesity
Low	Adverse sleep Anxiety Combined common mental disorders	Obesity All cause mortality Heart disease related mortality Depression Wheezing	CVD* events combined† CVD* morbidity Abdominal obesity Overweight	CVD* related mortality Colorectal cancer Crohn's disease
Very low	CVD* related mortality	Type 2 diabetes	Cancer overall Colorectal cancer Hypertension	Low high density lipoprotein concentration Metabolic syndrome Non-alcoholic fatty liver disease

<https://bit.ly/bmj-ultpro>

\*Cardiovascular disease  
†Mortality + morbidity

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## Ultra-processed foods and human health: an umbrella review and updated meta-analyses of observational evidence



we identified 13 articles:  
contained 39 meta-analyses for  
21 health outcomes.

update  
the identified meta-analyses  
based on 32 new articles



produce  
meta-analyses of  
new health outcomes  
based on 60 new articles



we included 122 individual articles on 49  
unique health outcomes:

- updated 19 identified meta-analyses
- conducted 28 meta-analyses for new health outcomes

### Study Population



general population

### Exposure



Intake of ultra-processed food

NOVA Classification 4

### outcomes

Outcomes	Studies, n	Random effects (95%CI)	Evidence class
Renal function decline	5	1.25 (1.18, 1.33)	I
Wheezing	4	1.42 (1.34, 1.49)	I
Depression	8	1.40 (1.26, 1.55)	II
Common mental disorders	13	1.41 (1.27, 1.58)	II
Diabetes	10	1.23 (1.13, 1.33)	II
Overweight	13	1.18 (1.11, 1.26)	II
Obesity	17	1.26 (1.18, 1.36)	II



# UPF and food additives in gut health and disease: IBD

Whelan et al. Nat rev gastroenterol hepatol 06.2024

highest quartile of UPF intake compared with lowest quartile

## Epidemiological studies:

- **M. Crohn: all 4 studies significant increased risk in high UPF vs low UPF:**
  - Meyer et al. 2022, Europe 413.590 part. HR 1.48 (0.79-2.76)
  - Chen et al. 2022, UK 185.849 part. HR 2.00 (1.32-3.03), p=0.001
  - Lo et al. 2022, USA 245.112 part. HR 1.70 (1.23-2.35), p=0.0008
  - Narula et al 2021, global 116.037 part. HR 4.90 (1.78-13.45), p=0.008
  
- CU: no significant increased HR in 4 studies

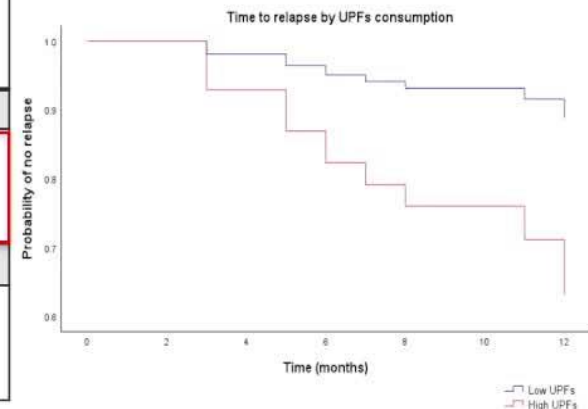
# UPF and disease relapse in M. Crohn, prospectief, 1 jr

Sarbagili-Shabat et al. Late breaking abstract UEGW 2024

## Dietary intake of ultra-processed foods is associated with disease relapse

Ultra-processed food	Low intake	High intake	HR (95% CI)	P-value
<b>Entire cohort (N=111)</b>				
N cases/N total	7/57	17/54	3.86 (1.30-11.47)	0.015
<b>No elimination diet sub-sample (N=103)</b>				
N cases/N total	6/51	17/52	4.38 (1.41-13.63)	0.011

HRs are adjusted for: sex, age (years), smoking status, energy intake (kcal/day), saturated fat (% of total kcal) and monounsaturated fatty acids (% of total kcal)



ueg.eu

# UPF and food additives in gut health and disease: CRC

Whelan et al. Nat rev gastroenterol hepatol 2024

highest quartile of UPF intake compared with lowest quartile

## ➤ CRC: 2 cohort studies: increased risk in high UPF vs low UPF (mannen):

- Fiolet et al. 2018, France 104.980 part. HR 1.23 (1.08-1.40), p=0.07 (8% vrouw)
- Wang et al. 2022, USA 46.341 man HR 1.29 (1.08-1.53), p=0.01
- Wang et al. 2022, USA 159.907 vrouw HR 1.04 (0.90-1.20), p=0.29 (NS)

### High UPF intake:

lower intake of fibre and higher intake of processed meat (risk factors CRC):

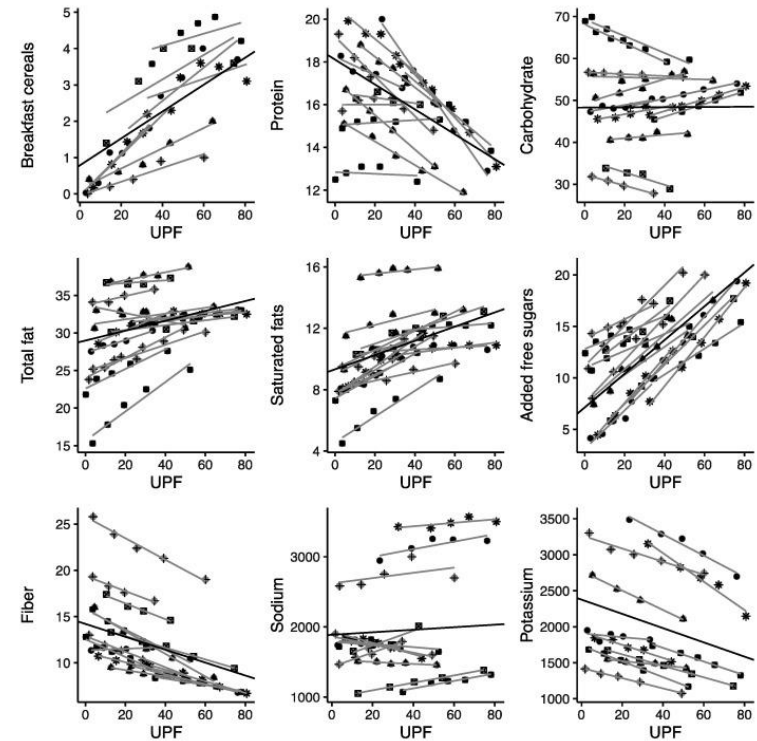
 rarely adjusted for in these cohorts

# UPF en nutritional dietary profile

Martini et al. Nutrients 2021

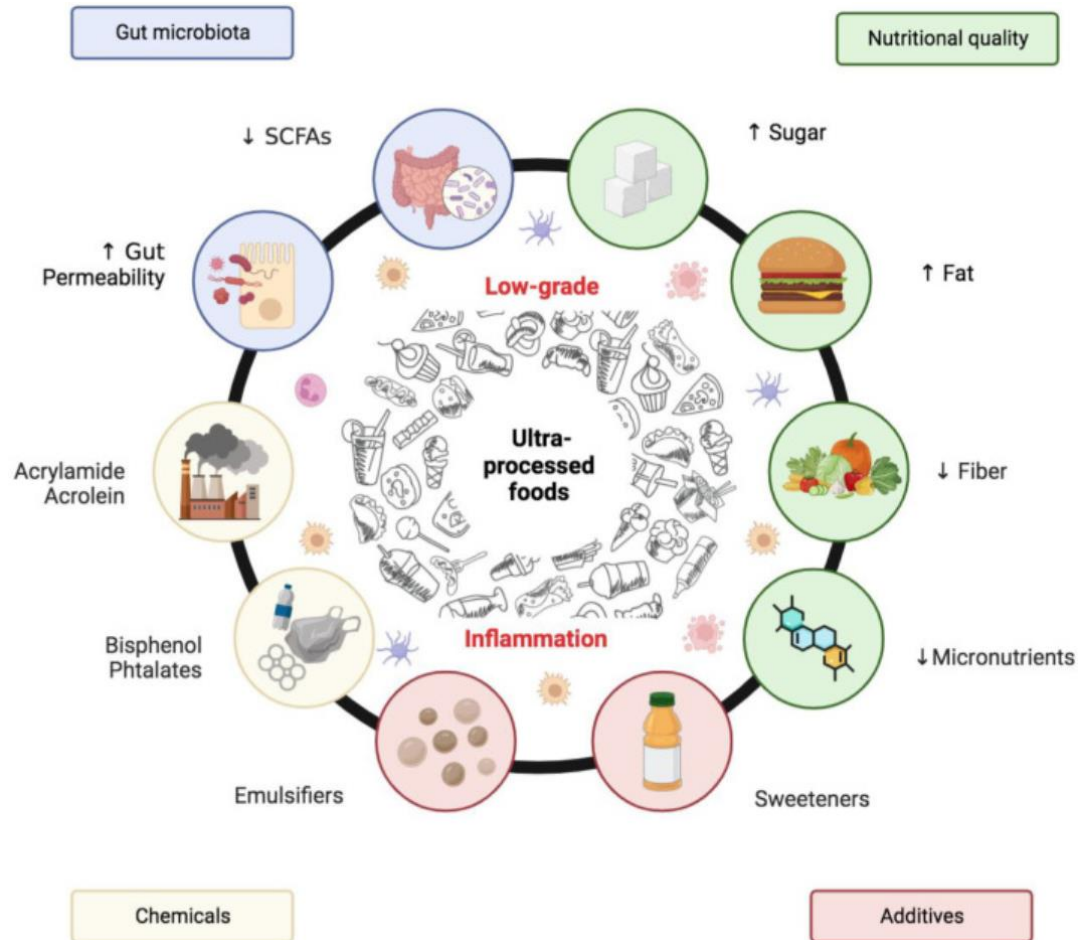
## Higher UPF intake associated with:

- **Higher intake** of energy, fat, saturated fat, free-sugars
- **Lower intake** of protein, fibre, K, vitamin A, B3, B12, C, D, E, P, Zn
- Epidemiological studies often adjust for energy and diet quality, but **very rarely adjust for these major differences in nutrient intake**



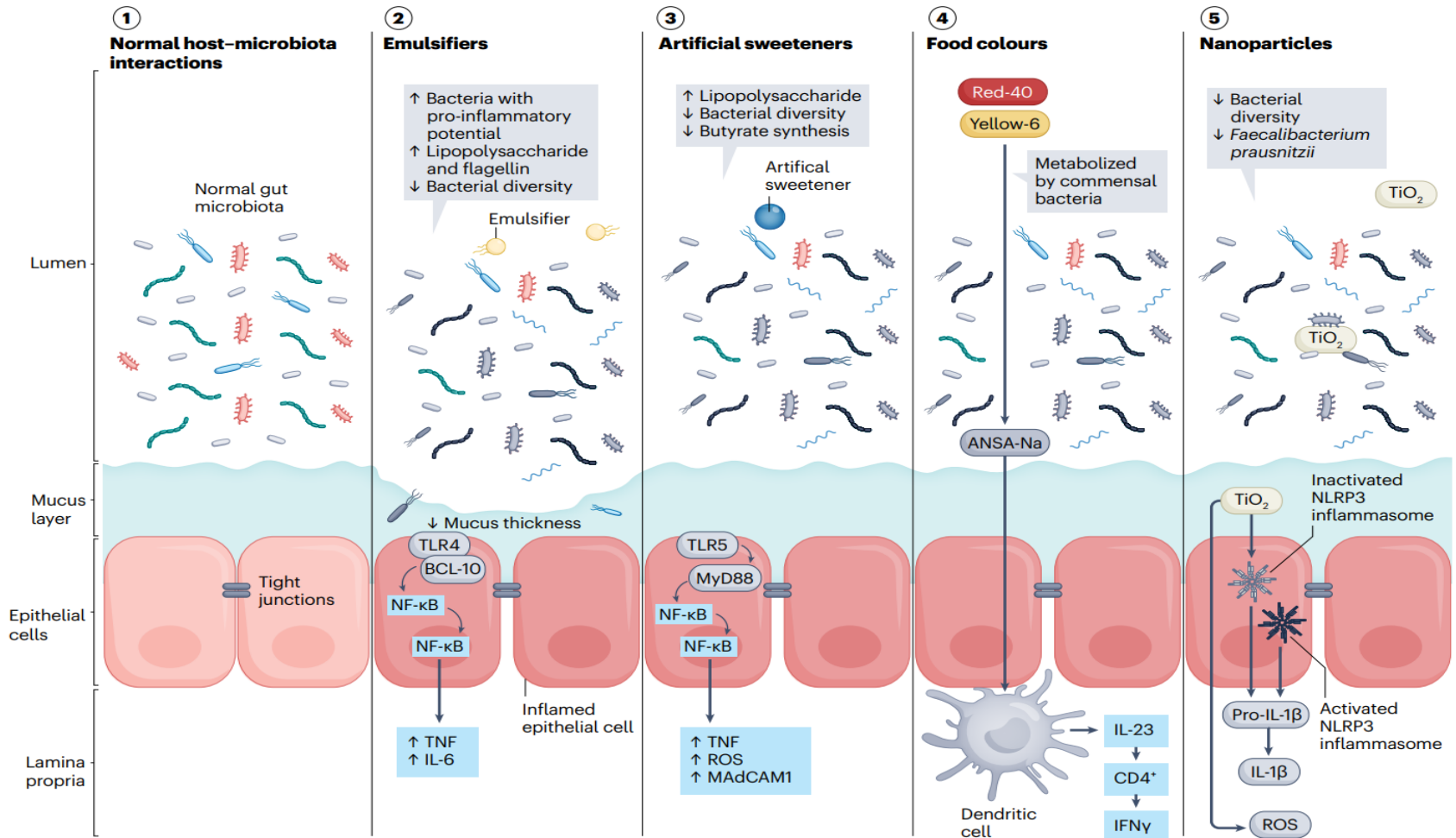
# Inflammatie en UPF

## Low-Grade Inflammation and UPF Consumption: A Review Asensi et al, Nutrients 2023



# Whelan et al. 2024: in vitro and animal models

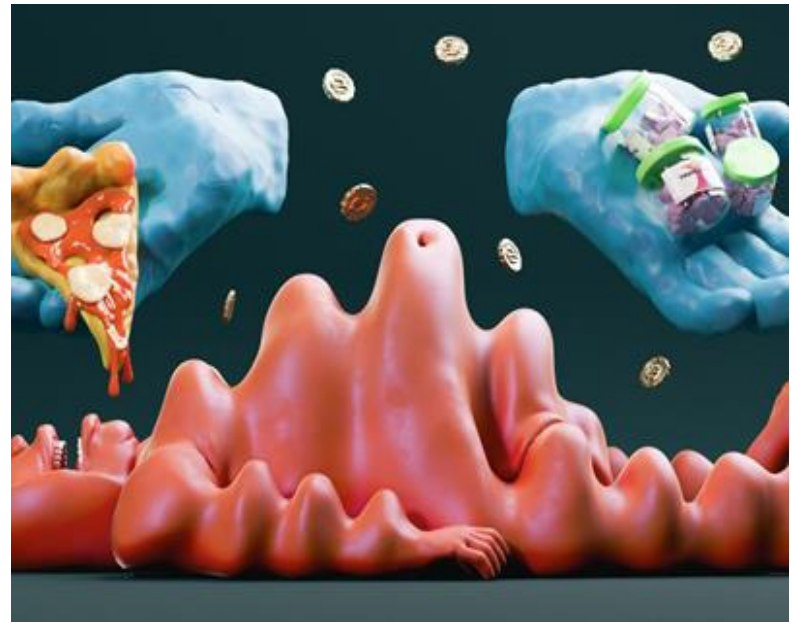
Nature Reviews Gastroenterology & Hepatology



# Van ongezonde snacks naar afslankmiddelen

Irene van den Berg en Mathilde de Jeu. NTVG 2024; 168: C5723

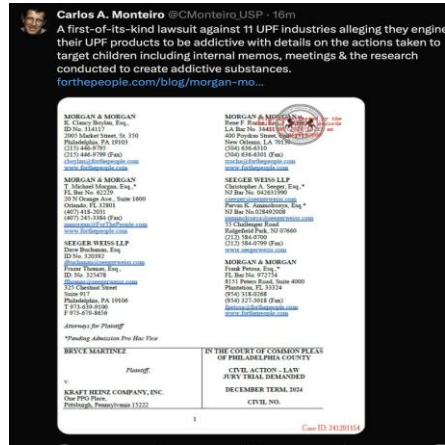
- Overeenkomsten tussen strategie van **tabaks- en voedingsindustrie**
- De consument mag **3x afrekenen bij voedingsconcerns:**
  - 1) Ongezonder eten
  - 2) Voedingsproducten bij vermageren
  - 3) Medicatie om te vermageren



# US lawsuit 02.2025

## Bryce Martinez vs 11 companies

- Claim: Bryce Martinez developed **type 2 diabetes and MAFLD by age 16** as a result of UPFs
- Claim: Major food companies engineer UPFs to make them as **addictive** as possible to consumers, especially children
- Claim: Large food companies were taken over by "Big Tobacco" (1980s) and used **their cigarette playbook** to develop addictive products, that they "aggressively marketed to **children and minorities**"



### Companies named in the lawsuit:

- Kraft Heinz Company Inc
- Mondelez International Inc
- The Coca-Cola Company
- PepsiCo Inc
- General Mills Inc
- Nestle USA Inc
- Kellanova
- WK Kellogg Co.
- Mars Incorporated Inc
- Congara Brands Inc
- Post Holdings, Inc





# Take home messages

## Darm-voeding-microbiom-hersen interactie

1. **Dieet:** belangrijke rol bij (darm)gezondheid en pathogenese (darm)ziekte

**UPF:** ander soort voeding:

- **voedingsetiketten/educatie**
- **wetgeving/taxen/reclameregulering (kinderen) UPF**
- **richtlijnen UPF in voeding**

2. **UPF:** Trial Hall et al. + observationeel epidemiologisch onderzoek:

➤ **associatie** met gestoorde nierfunctie, wheezing, overgewicht/obesitas, diabetes mellitus type 2, psychische aandoeningen zoals depressie (mogelijk verhoogd risico M. Crohn en CRC, echter evidence quality low)

➤ **oorzaak?:** bewerking of andere bestanddelen in UPF-dieet:

bijv. voedseladditieven: data vanuit **in vitro studies en dierexperimenten**



**Voedingstrials bij gezonden en patiënten nodig en bezig!**

bijv. ADDapt RCT: Crohn - low food additive diet vs control, Whelan et al.

# Literatuur/info

## 1 trial 2019 en 3 Reviews 2024:

- **Ultra-processed diets cause excess calorie intake and weight gain:**  
An Inpatient Randomized Controlled Trial of Ad Libitum Food Intake.  
Hall et al. Cell Metabolism 2019; 30: 67–77
- **Ultra-processed food exposure and adverse health outcomes: umbrella review of epidemiological meta-analyses.**  
Lane et al. BMJ 2024; 384: e077310
- **Ultra-processed foods and human health: An umbrella review and updated meta-analyses of observational evidence.**  
Dai et al. Clinical Nutrition, 2024; 43(6): 1386-1394
- **Ultra-processed foods and food additives in gut health and disease.**  
Whelan et al. Nat. Rev. Gastroenterol. Hepatol. 2024; 21: 406–427

## Aanraders voor de liefhebber:

- **Ultra-processed people**, the science behind food that isn't food.  
Chris van Tulleken (2023)
- **Van ongezonde snacks naar afslankmiddelen.**  
Irene van den Berg en Mathilde de Jeu. NTVG 2024; 168: C5723
- **Ultra-processed foods, diet quality, and health using the NOVA classific. system.**  
Monteiro et al. Rome: FAO of the UN, 2019
- **Waarom we een zak chips altijd in één keer leegeten.**  
Aarts (2024)