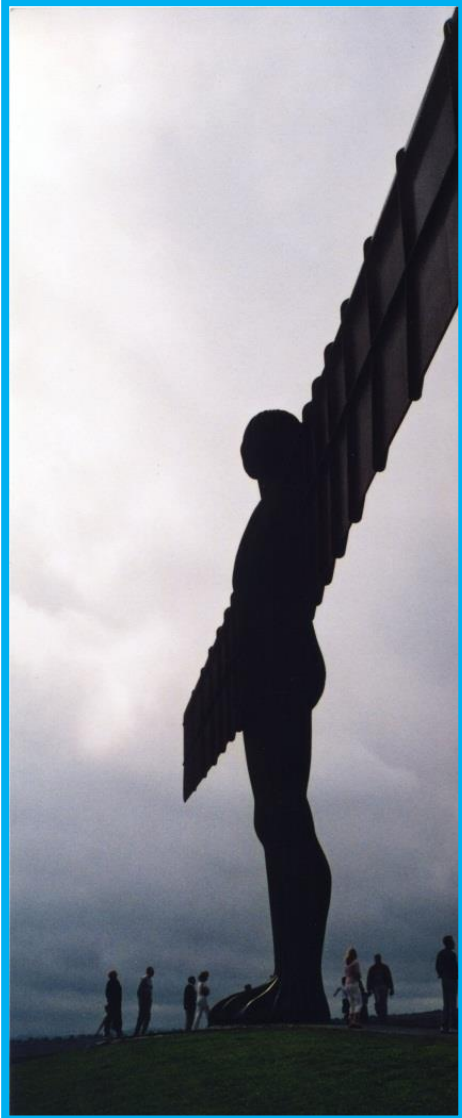


The future of research in Personalised Nutrition



John Mathers
Human Nutrition Research Centre
Institute of Cellular Medicine



Human Nutrition
Research Centre

UK



Personalised nutrition is becoming big business

habit
FOOD, PERSONALIZED*

HOW IT WORKS

SCIENCE

SUCCESS STORIES

SHOP NOW



NEW SEASON, NEW START

\$100 OFF ENDS 09/10

Take the guesswork out of eating right. For life.

Let's end the pseudo-science and fad-dieting. Learn how to eat for the one, unique you.

SHOP NOW

SENSITIVITIES



HERO FOODS



HOW YOU HANDLE CARBS
You're a carb champion!

20%
PROTEIN

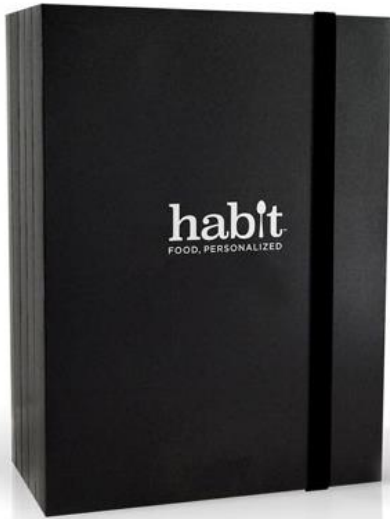
30%
FATS

50%
CARBS

SERVINGS

- Starches
- Legumes
- Fruits
- Vegetables
- Nuts & Seeds
- Oils
- Dairy
- Protein





1 TESTING

You collect samples at home and send them to a lab.

Using the at-home kit, you collect your bio samples and send them via a pre-labeled package to Aegis, a CLIA and CAP certified lab. The Habit app makes your test process easy by stepping you through it with instructions and timers.

[LEARN MORE](#)

Metabolic challenge test at home

< METABOLISM >

Your metabolic markers, such as glucose and triglycerides, tell us how your body responds to carbs, fats, and protein after you drink the Habit Challenge® Shake, which is nutritionally similar to a real meal.



DAY TWO

Focus on metabolic health



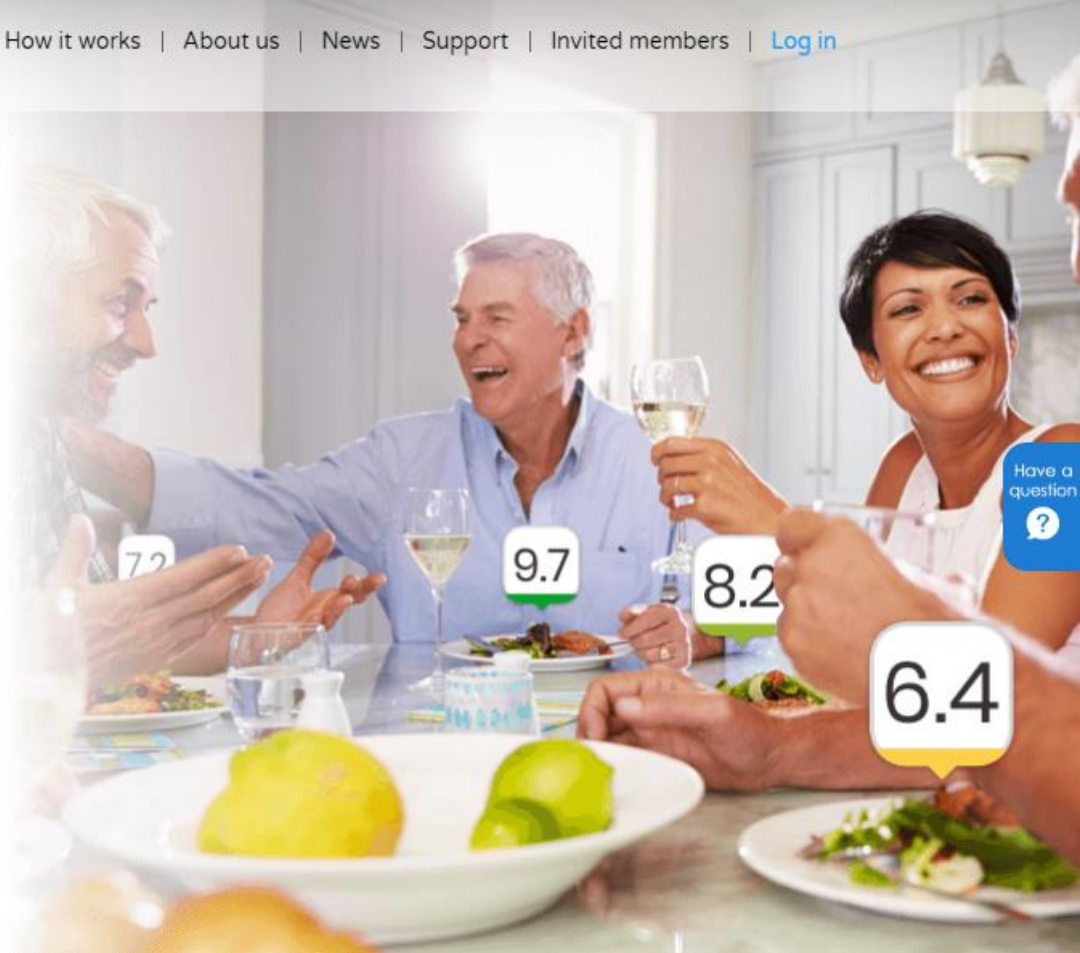
[Get the kit](#) | [Microbiome & Nutrition](#) | [How it works](#) | [About us](#) | [News](#) | [Support](#) | [Invited members](#) | [Log in](#)

Blood Sugar Control Made Easy

The Algorithm Diet personalized to you.

Watch a demo of the DayTwo app

Order now



● DAY TWO



You receive your
personalized nutrition app

DayTwo prepares unique personalized nutrition recommendations for each and every individual.

- Your personalized recommendations can be used for normalizing blood sugar levels throughout the day and night.
- We generate food recommendations specific to your body, like Top Meals for breakfast, lunch and dinner.

[Read More](#)

THE HUMAN MICROBIOME PROJECT SAYS THE HUMAN BODY HAS 100 TRILLION MICROSCOPIC LIFE FORMS LIVING IN IT.


Oooh I love carbs

Yuck carbs make me sick

Give us what we want to eat!

YOU CALL THIS LIVING?

6/15/12
S. MILLER
NO HARTFORD COURAGE

A close-up photograph of a woman's face, focusing on her eyes and dark hair with bangs. The background is a soft, out-of-focus grey.

**A warm
welcome
to you. And
your
39 trillion
bacteria.**

“Simple” sample collection at home

1 Sample tube



This tube contains a special stabilizing fluid that preserves your sample during its journey to our laboratory.

2 Two sterile swabs

3 Replacement sample tube

4 Sample return bag

5 Return mailer



Check Your Eligibility

uBiome



Your gut microbiome holds *insights*
into your health and wellbeing

Get the *whole* picture of your gut microbiome

The Microba *Insight*[™] report provides personalised dietary suggestions to promote the growth of beneficial gut bacteria. If you have a medical condition or take regular medication, it is important to speak to your medical practitioner before making significant changes to your diet.

Increasing sophistication

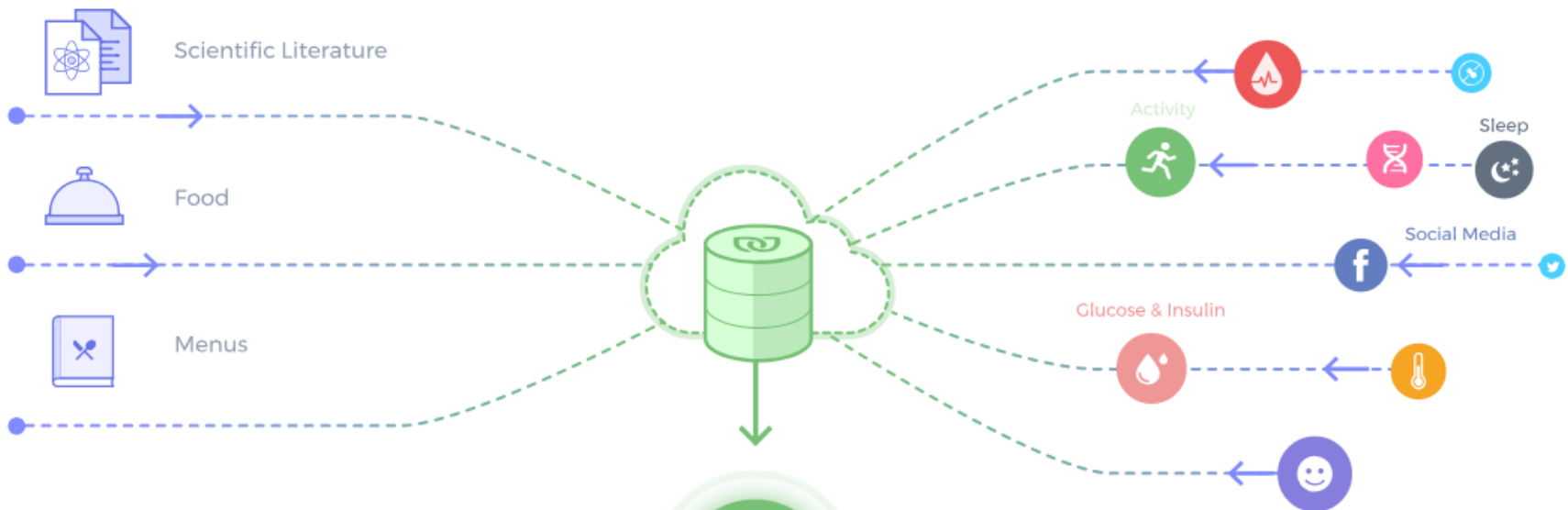
FOODPRINT™

The digital signature of how food affects the body.

The Nutrino engine recognizes that not only will two people respond differently to the same food, but a single individual may respond differently to the same food at different times.

Food Analysis System

Individual Inputs



 nutrino





Data is only valuable as what you can do with it, and the applications of FoodPrint bring real results that improve lives.



Chronic Disease
Management



Physician Tools



Food Trends
Identification



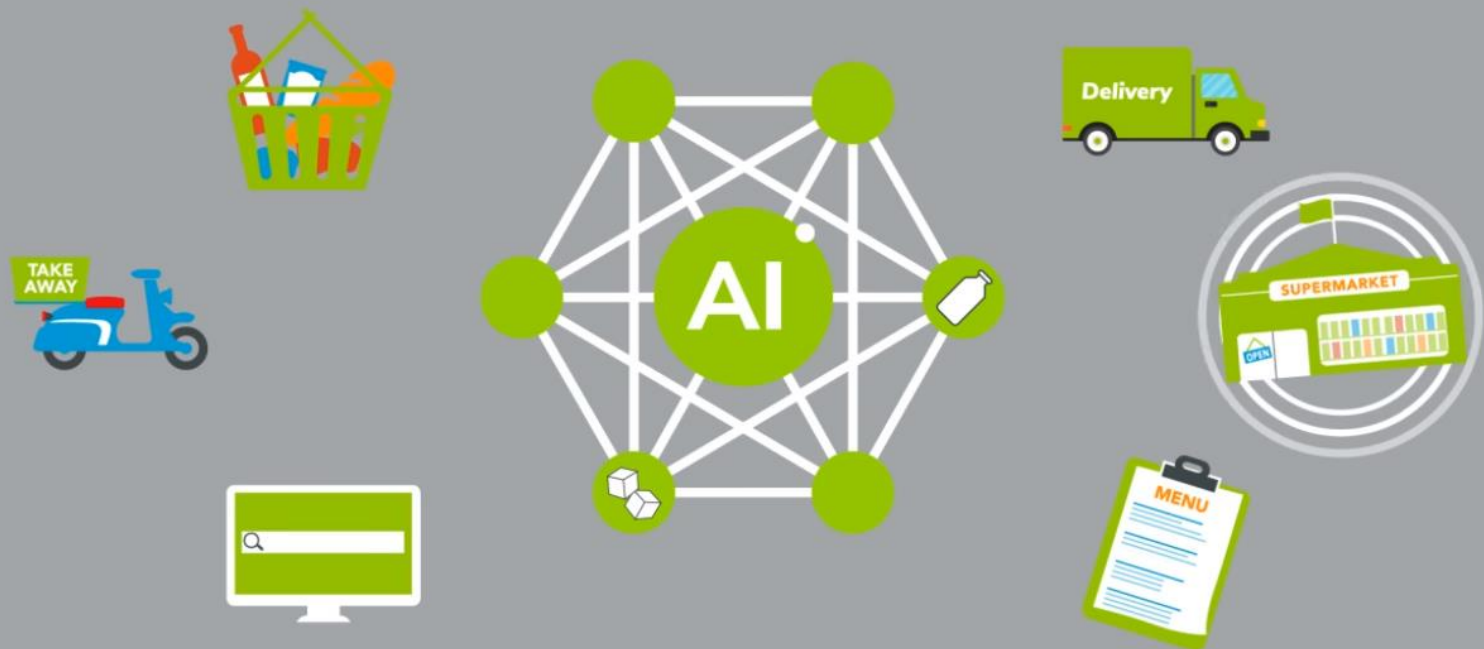
Wellbeing
Improvement



Weight Management

Working with food industry and corporate clients

**Deliver a truly personal experience
to your customers**



Our mission is to transform
the world of food.
Globally.



64%
of the world's population
now follows some form
of exclusion diet.



We believe
finding food to buy,
cook and eat should be
a joy, not a chore.



We know
most people now have a
dietary requirement.
Sometimes multiple!



We maintain
that finding suitable
foods shouldn't be a
frustrating experience.



We exist
to take the fuss out of
finding the right food –
whatever the need.

Nestlé and Samsung to collaborate on digital nutrition and health

Jul 28, 2016



Nestle pivots to health research with artificial intelligence and DNA testing for personalised diets

Corporation moves away from sugary products to focus on market for health conscious food

Lisa Du | Corinne Gretler | Maiko Takahashi | 5 days ago | 6 comments



Structure of presentation

- ❑ What is personalised nutrition?
- ❑ What's the research evidence that it works?



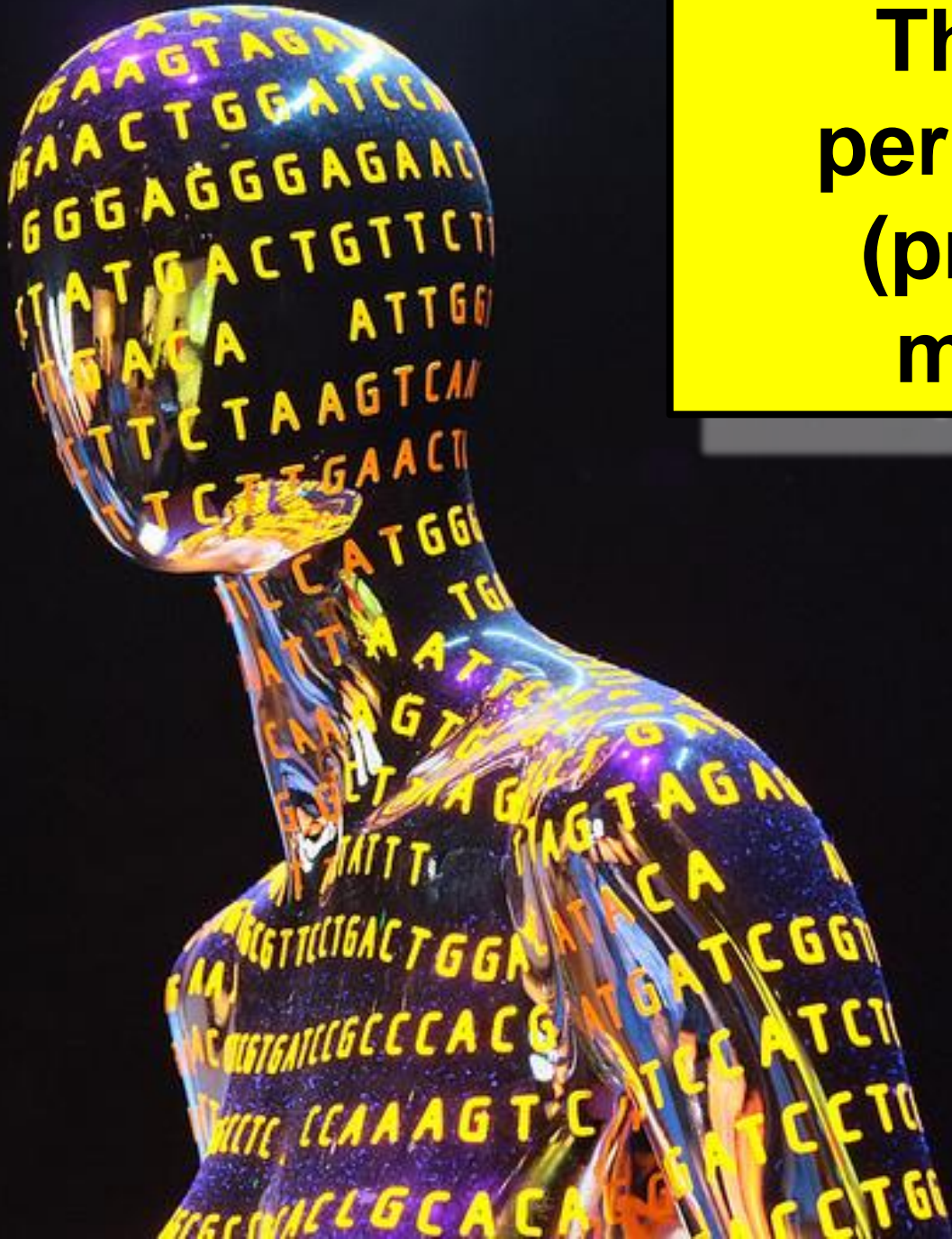
What is personalised nutrition?

- An approach that uses information on individual characteristics to develop targeted nutritional advice, products, or services.

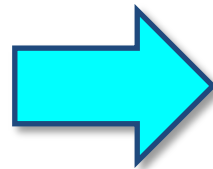
Ordovas JM *et al.* (2018) *BMJ*
361: k2173



**The era of
personalised
(precision)
medicine**

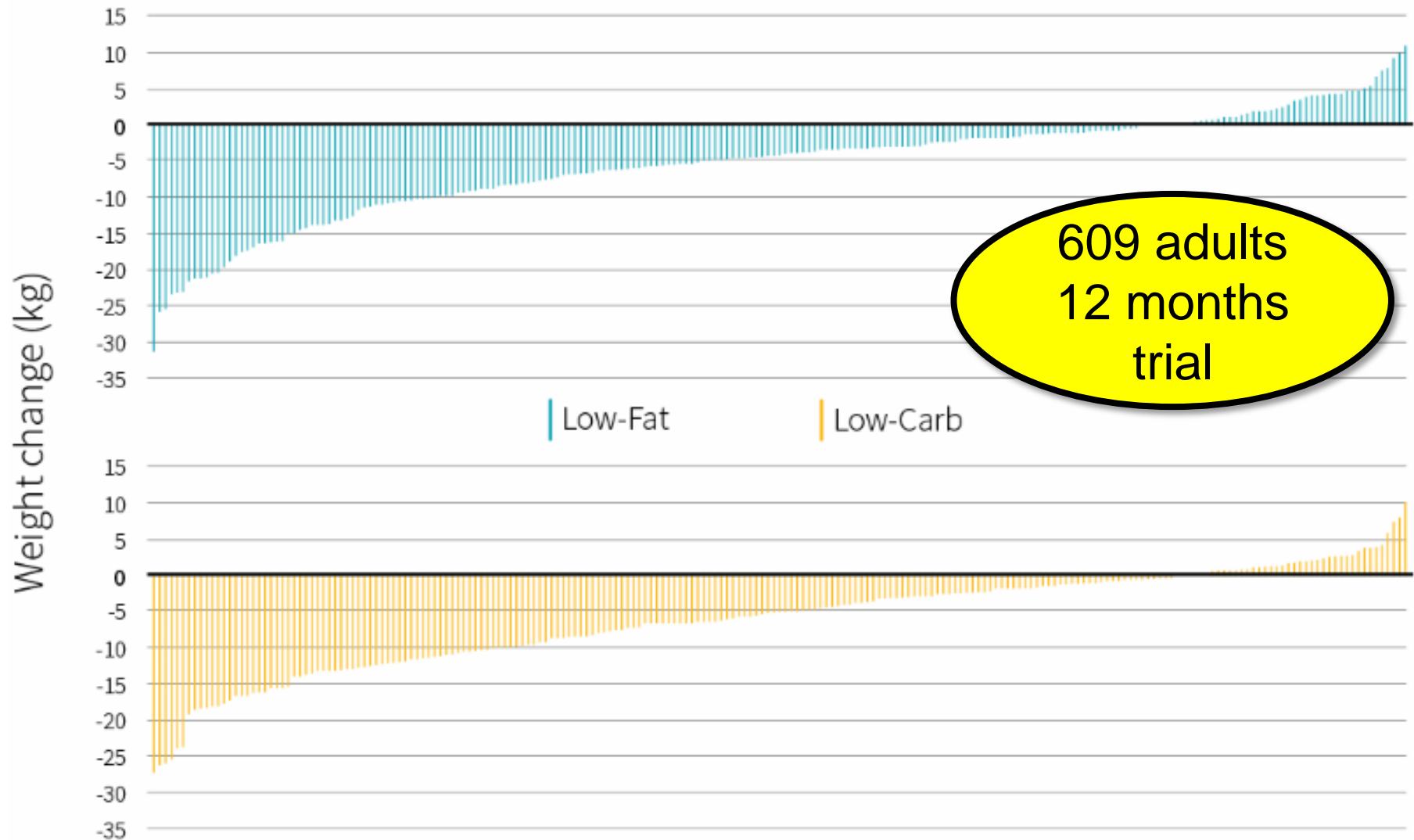


Personalised nutrition approaches



Personalised approach

Individual variation in weight loss



Rationale for personalised approaches to improving nutrition

Personalised approaches may be more effective because:

- Such approaches are more relevant (biological basis)
- Such approaches feel more relevant (improve motivation...)





Newcastle
University

Human Nutrition
Research Centre



food4me.org

Does personalised nutrition work?

John Mathers

Human Nutrition Research Centre

Newcastle University

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration. (Contract n°265494)

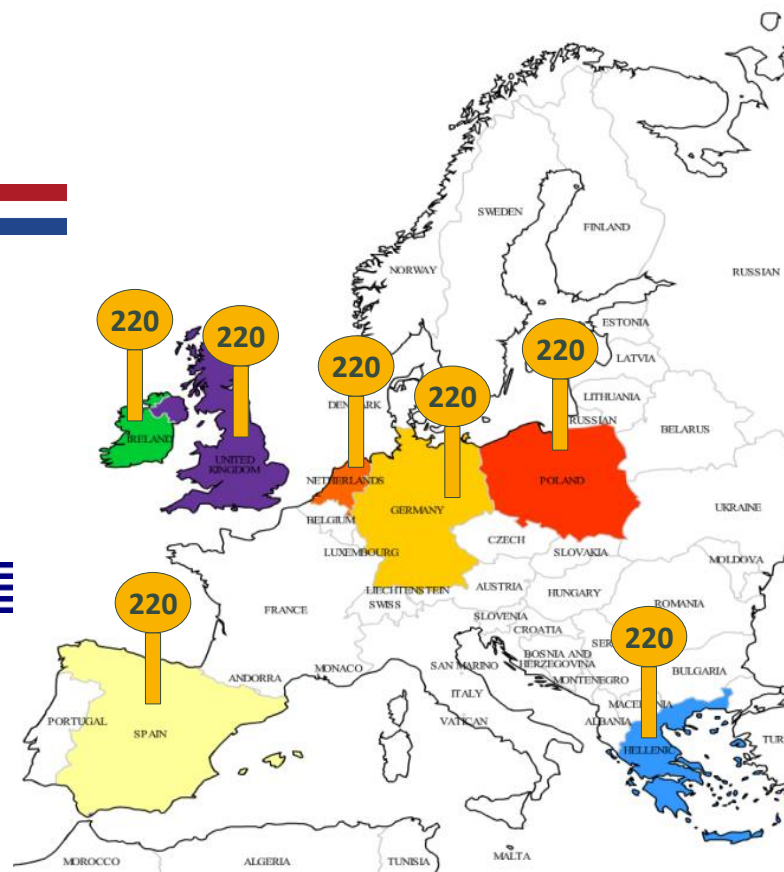


Recruited 1609 adults across 7 EU countries

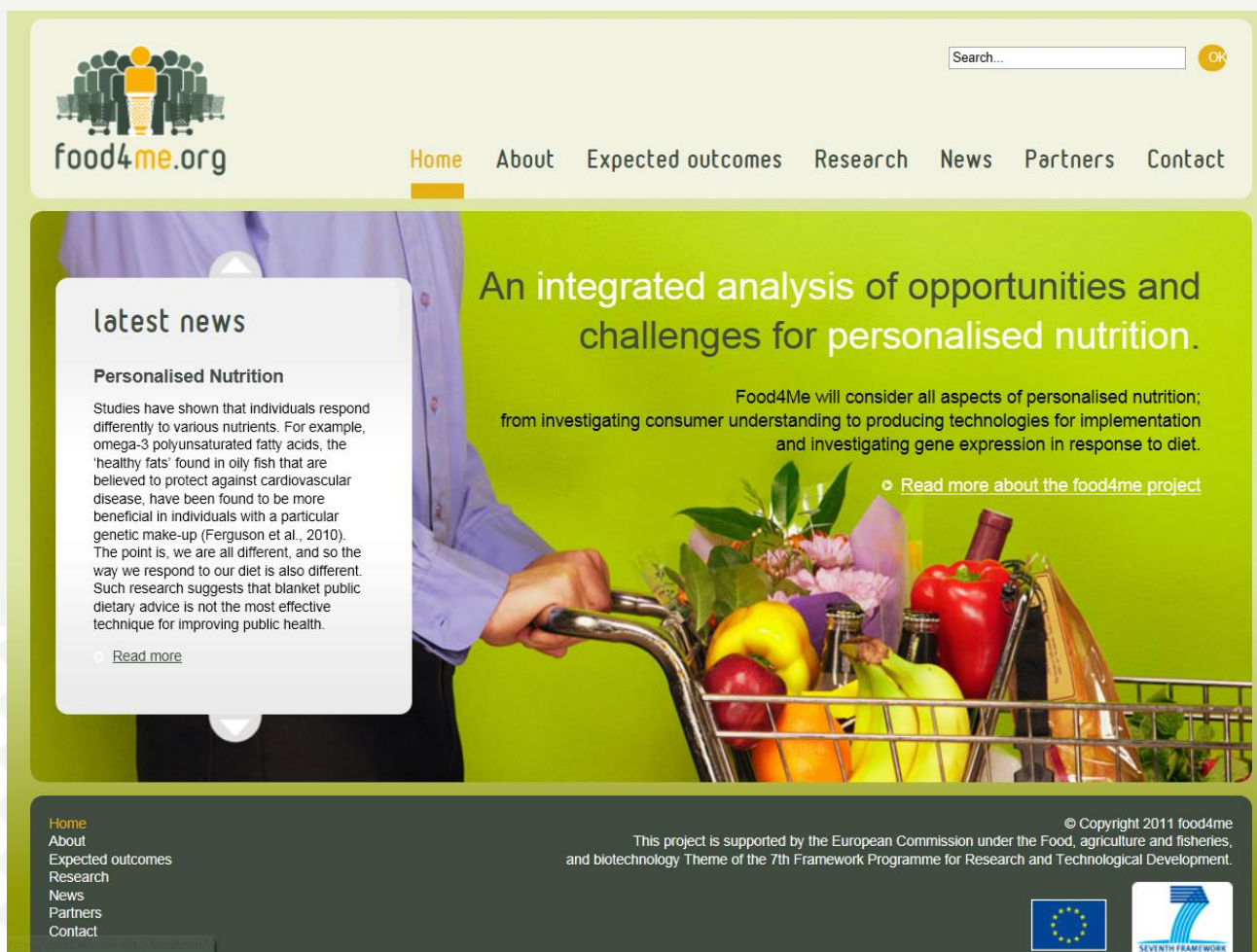
➤ Led by John Mathers, Newcastle University 

➤ 7 recruitment sites

1. University College Dublin (Ireland) 
2. Maastricht University (The Netherlands) 
3. University of Navarra (Spain) 
4. University of Reading (UK) 
5. National Food and Nutrition Institute
Warsaw (Poland) 
6. Harokopio University Athens (Athens) 
7. Technische Universitaet Muenchen
(Germany) 



Participant recruitment



The screenshot shows the food4me.org website homepage. At the top left is the logo, and at the top right is a search bar with an 'OK' button. Below the logo is a navigation menu with links: Home (highlighted), About, Expected outcomes, Research, News, Partners, and Contact. The main content area features a large green banner with a person pushing a shopping cart filled with fresh produce. The banner text reads: 'An integrated analysis of opportunities and challenges for personalised nutrition.' Below this, it states: 'Food4Me will consider all aspects of personalised nutrition; from investigating consumer understanding to producing technologies for implementation and investigating gene expression in response to diet.' A link 'Read more about the food4me project' is provided. On the left side of the banner, there is a 'latest news' section titled 'Personalised Nutrition' with a paragraph of text and a 'Read more' link. The footer contains a secondary navigation menu, copyright information for 2011, and logos for the European Union and the Seventh Framework Programme.

Search... OK

food4me.org Home About Expected outcomes Research News Partners Contact

latest news

Personalised Nutrition

Studies have shown that individuals respond differently to various nutrients. For example, omega-3 polyunsaturated fatty acids, the 'healthy fats' found in oily fish that are believed to protect against cardiovascular disease, have been found to be more beneficial in individuals with a particular genetic make-up (Ferguson et al., 2010). The point is, we are all different, and so the way we respond to our diet is also different. Such research suggests that blanket public dietary advice is not the most effective technique for improving public health.

[Read more](#)



An integrated analysis of opportunities and challenges for personalised nutrition.

Food4Me will consider all aspects of personalised nutrition; from investigating consumer understanding to producing technologies for implementation and investigating gene expression in response to diet.

[Read more about the food4me project](#)

Home
About
Expected outcomes
Research
News
Partners
Contact

© Copyright 2011 food4me
This project is supported by the European Commission under the Food, agriculture and fisheries, and biotechnology Theme of the 7th Framework Programme for Research and Technological Development.



Web-based randomised controlled trial

Randomised to 4 treatments



Level 0: Generic dietary advice (Control)



Level 1: Personalisation based on **DIETARY** analysis



Level 2: Personalisation based on **DIETARY + PHENOTYPIC** analysis



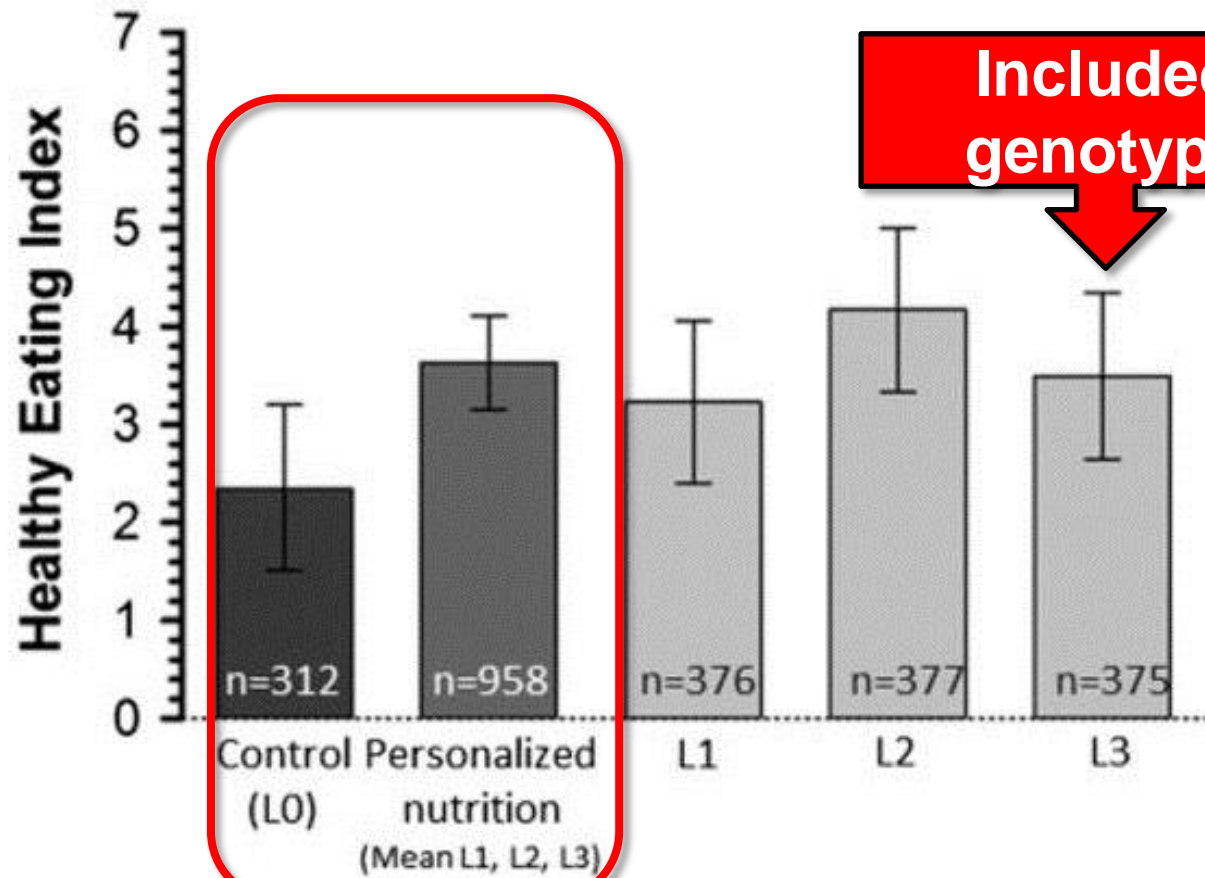
Level 3: Personalisation based on **DIETARY + PHENOTYPIC + GENOMIC** analysis



Generating personalised nutrition advice




Personalised nutrition improved dietary behaviour



Take home messages



**Personalised
nutrition
works**



**No added
advantage of
phenotypic or
genetic information**



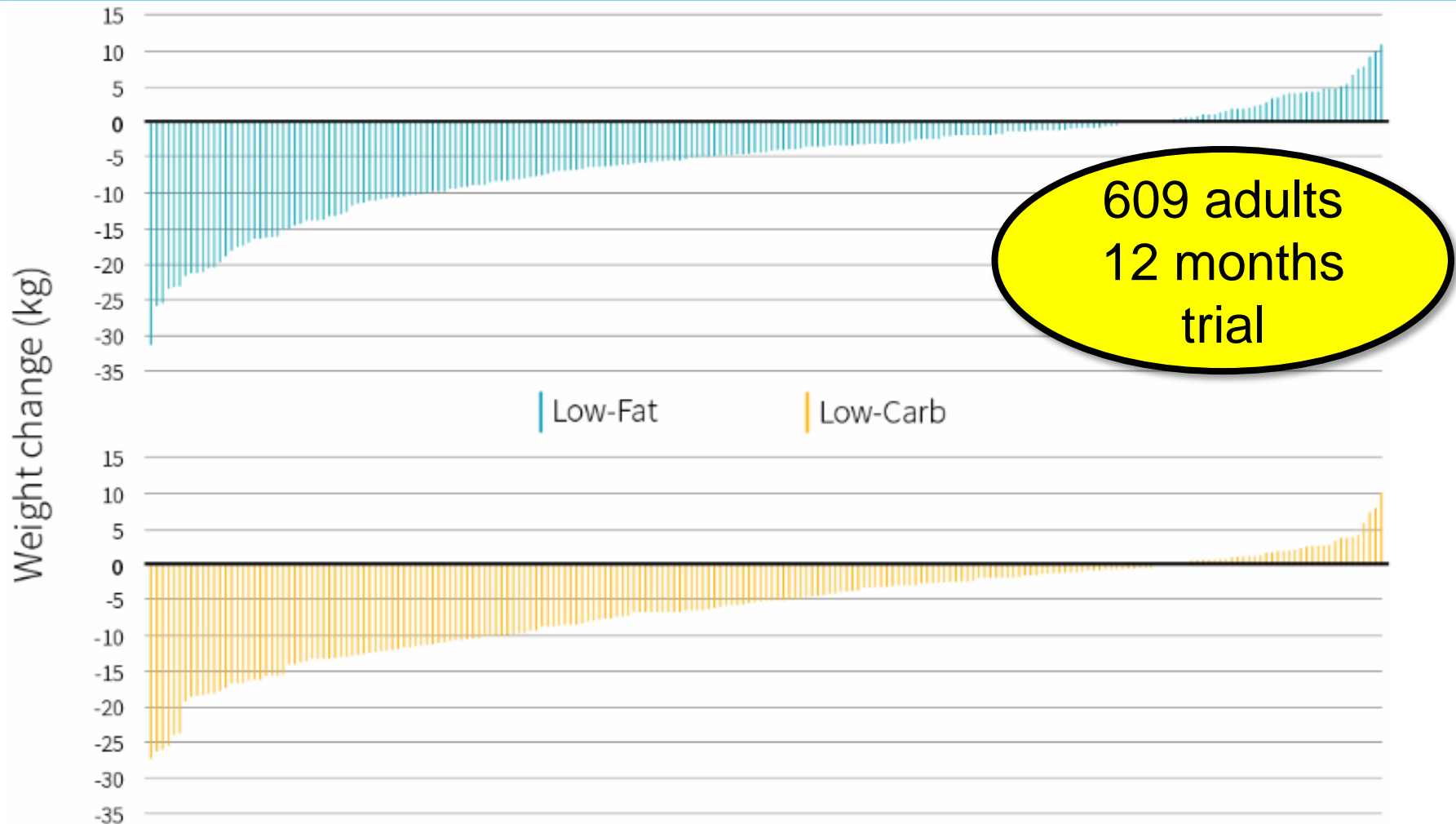
**Internet-based
delivery is
effective**

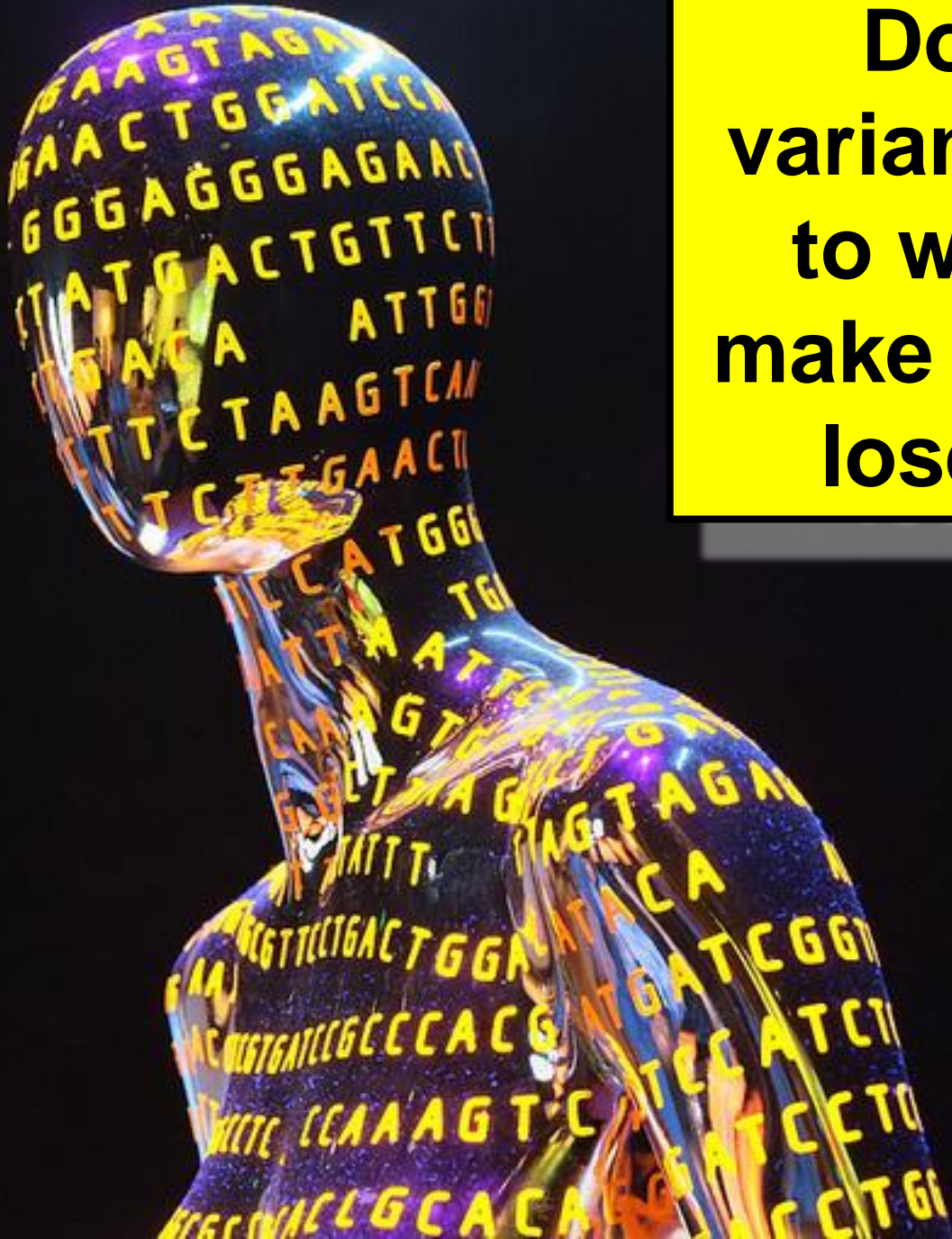


Celis-Morales C *et al.*
(2017) *Int. J. Epidemiol.*
46, 578-588



Does genetics explain individual variation in weight loss?





Do genetic variants that lead to weight gain make it difficult to lose weight?

Does *FTO* genotype influence weight loss in intervention studies?

FTO genotype and weight loss: systematic review and meta-analysis of 9563 individual participant data from eight randomised controlled trials

Katherine M Livingstone,^{1,2} Carlos Celis-Morales,^{1,3} George D Papandonatos,⁴ Bahar Erar,⁴ Jose C Florez,^{5,6} Kathleen A Jablonski,⁷ Cristina Razquin,^{8,9} Amelia Marti,^{9,10} Yoriko Heianza,¹¹ Tao Huang,^{11,12} Frank M Sacks,¹³ Mathilde Svendstrup,^{14,15} Xuemei Sui,¹⁶ Timothy S Church,¹⁷ Tiina Jääskeläinen,^{18,19} Jaana Lindström,²⁰ Jaakko Tuomilehto,^{21,22} Matti Uusitupa,¹⁸ Tuomo Rankinen,²³ Wim H M Saris,²⁴ Torben Hansen,¹⁴ Oluf Pedersen,¹⁴ Arne Astrup,²⁵ Thorkild I A Sørensen,^{14,26} Lu Qi,^{11,13} George A Bray,¹⁷ Miguel A Martinez-Gonzalez,^{9,10} J Alfredo Martinez,^{9,10,27} Paul W Franks,^{13,28} Jeanne M McCaffery,²⁹ Jose Lara,^{1,30} John C Mathers¹

thebmj

No effect of *FTO* genotype on BMI response to weight loss intervention

Study	Treatment			Control			Mean difference IV, random (95% CI)	Weight (%)	Mean difference IV, random (95% CI)
	Mean	SD	Total	Mean	SD	Total			
Body mass index									
DPP ²⁰	-0.03	2.83	1970	0.18	2.83	1970	-0.13	26.70	-0.13 (-0.34 to 0.08)
DREW ¹⁴	-0.12	1.85	72	0.18	1.85	72	-0.18	2.40	-0.18 (-0.88 to 0.52)
Finnish DPS ²¹	-0.09	2.83	1970	0.18	2.83	1970	0.05	2.40	0.05 (-0.72 to 0.82)
Food4Me ³⁶	-0.16	1.85	72	0.18	1.85	72	-0.15	2.40	-0.15 (-0.44 to 0.14)
Look AHEAD ¹⁵	0.00	2.83	1970	0.18	2.83	1970	-0.15	2.40	-0.15 (-0.06 to 0.36)
MUGENOB ¹⁷	0.00	1.85	72	0.18	1.85	72	0.00	2.40	0.00 (-0.29 to 0.29)
POUNDS LOST ¹⁶	-0.10	2.83	1970	0.18	2.83	1970	-0.14	2.40	-0.14 (-0.72 to 0.44)

Similar findings for body mass and for waist circumference

Data were adjusted for age, sex, baseline, ethnicity, educational level, socioeconomic status, physical activity and smoking

Lack of effect of *FTO* genotype on weight loss is robust

Findings unaffected by:

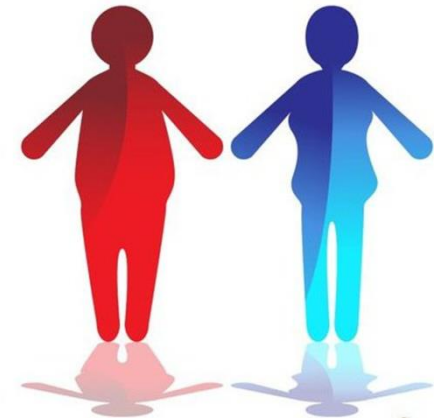
Intervention characteristics

- Modality (diet or diet + exercise)
- Duration



Participant characteristics

- Age
- Sex
- Initial BMI
- Race/ ethnicity



Behaviour change is key

mustangsoft.net



Exercise is a dirty
word. Every time
I hear it, I wash my
mouth out with
chocolate.

Charles M. Schulz



Genetic basis of behaviour change?

Genetic basis for:

- Attention
- Memory
- Reward
- Motivation...

Behavioural genetics



Systems approaches for more effective Personalised Nutrition



Participant characteristics

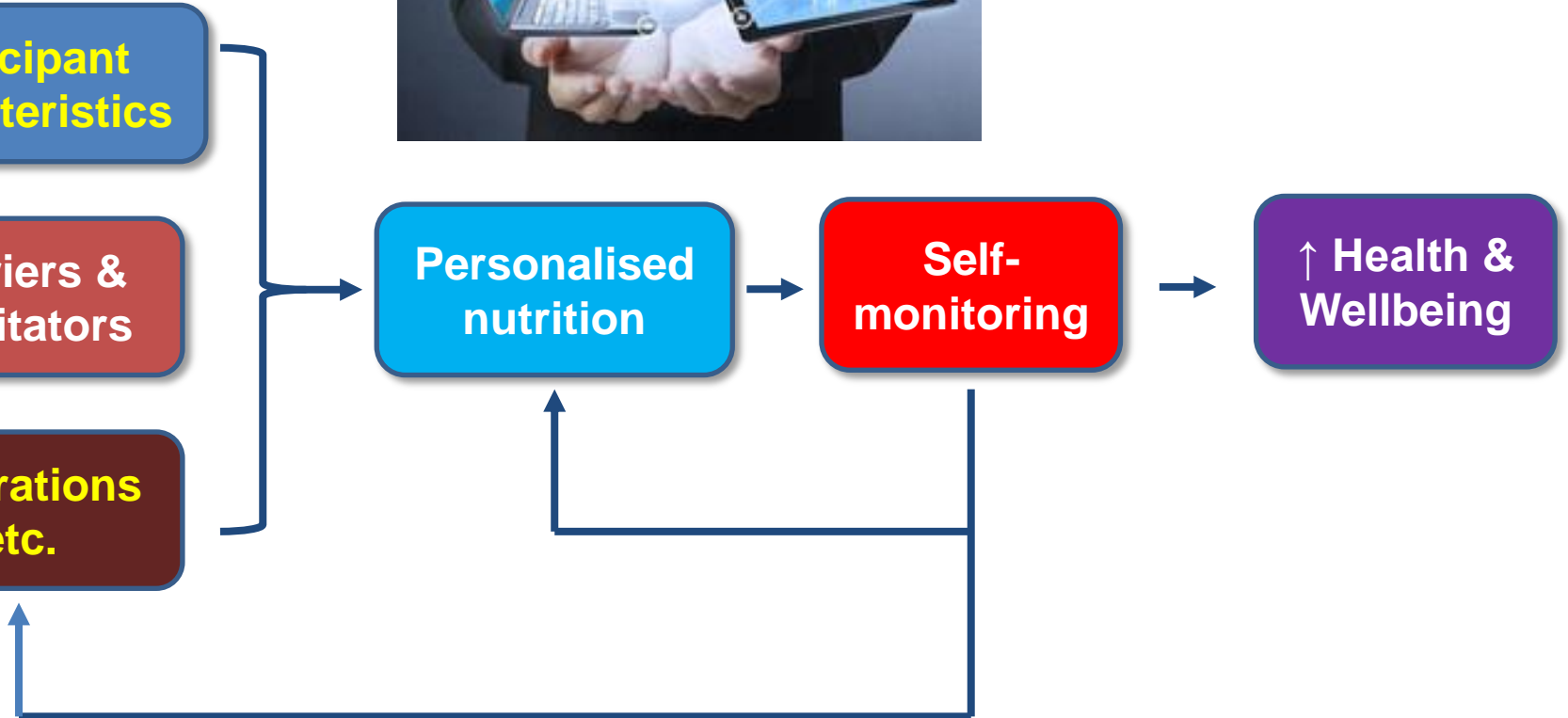
Barriers & facilitators

Aspirations etc.

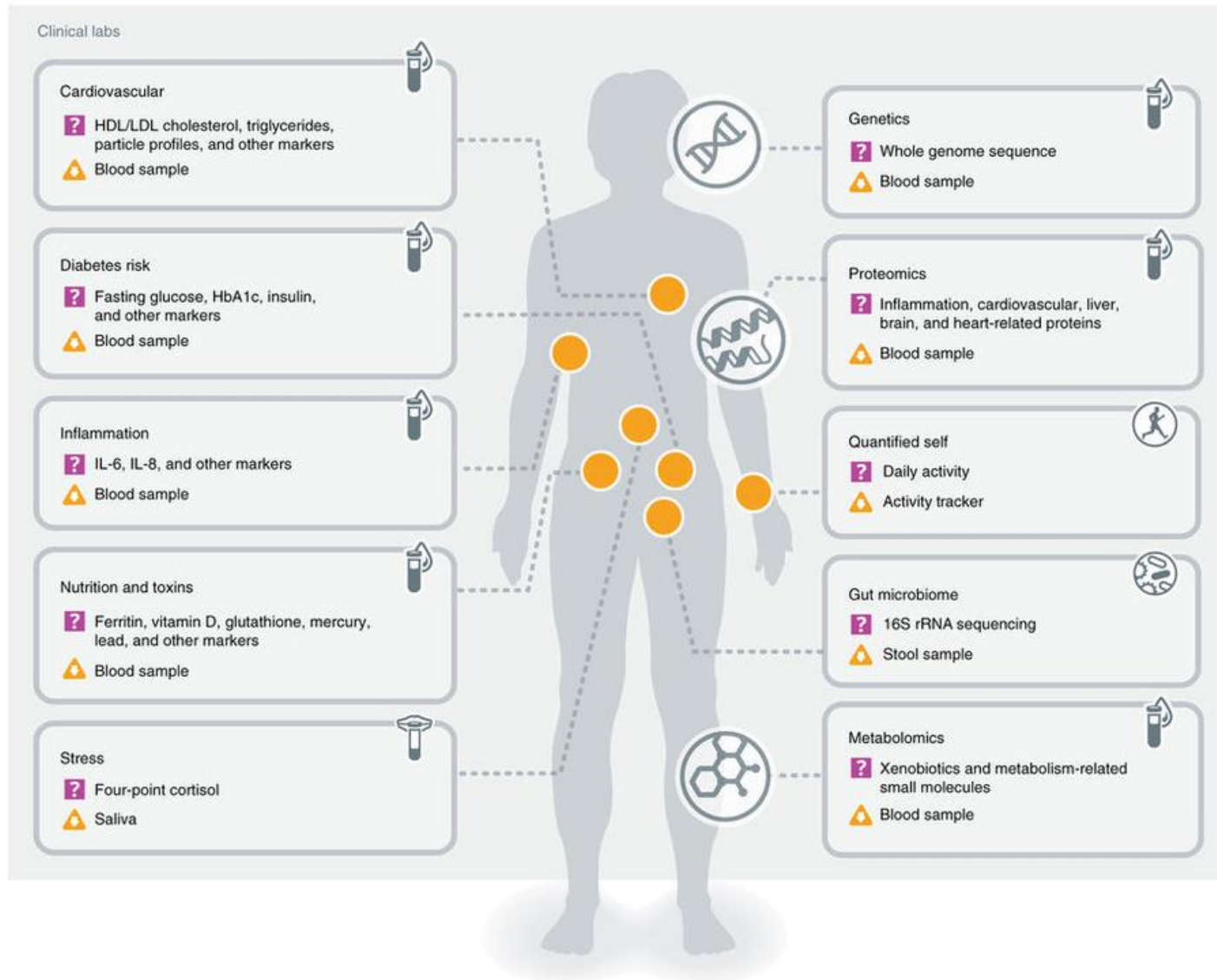
Personalised nutrition

Self-monitoring

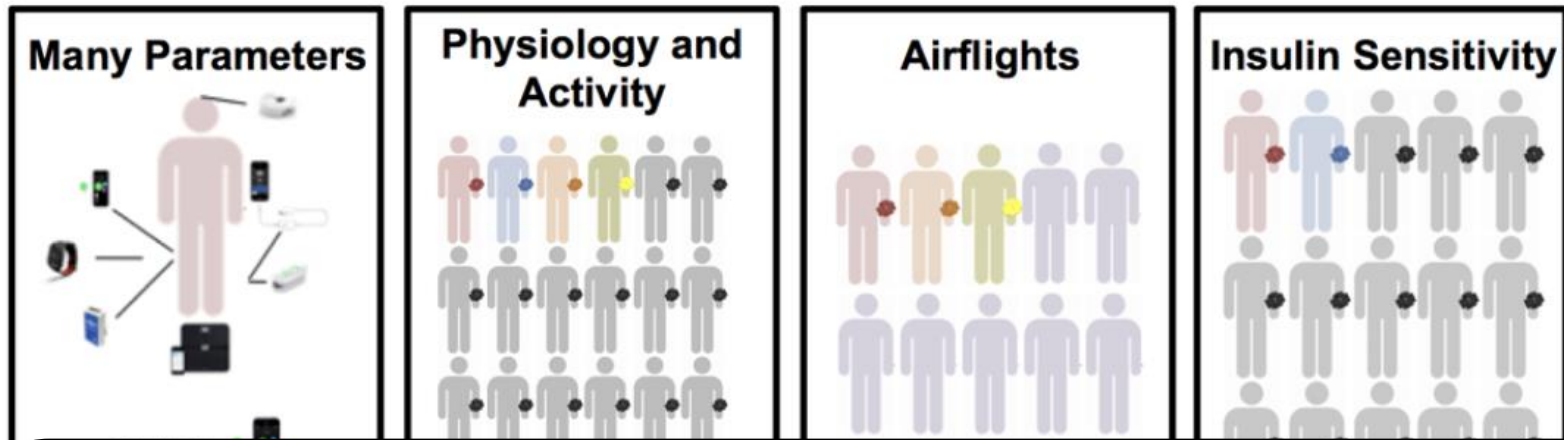
↑ Health & Wellbeing



Pioneer 100 Wellness Project



“Continuous” real-time data collection



More than 250,000 measurements
per day on 43 people for up to 2
years



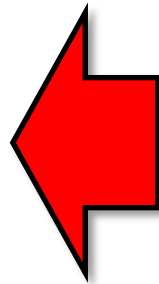
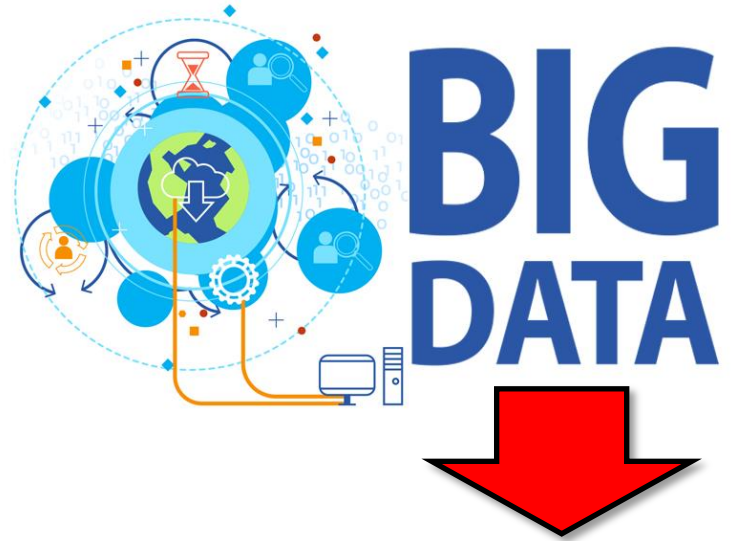
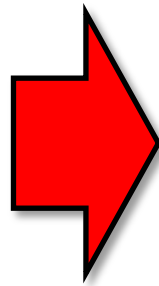
Technology for continuous biomarker measurement



Spray-on
nanomesh
wearables for
health
monitoring

Professor Takao
Someya
Graduate
School of
Engineering
University of
Tokyo

Wearable technologies, big data and artificial intelligence for more effective personalised nutrition



Challenges

- Potential market for personalised nutrition is huge
- Personalised nutrition is in the market-place **before** we have good evidence of what works (and what doesn't work)
- Business has developed without regulatory oversight, defined standards and consumer protection
- Most commercial offerings use proprietary algorithms that are not subject to independent verification
- Will personalised nutrition exacerbate, or ameliorate, health disparities?