

# The Science of Weight Loss: Reasons why most diets fail and how to succeed

Notes of a presentation given by Dr. John Mauremootoo of [New Paradigm Health](#). PowerPoint presentation available for download from [SlideShare](#).

## Slide 001: Title Slide

Why Most Diets Fail & How to Succeed

Dr. John Mauremootoo

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The Science of Weight Loss:

*New Paradigm Health is a health consultancy which works with individuals and groups to identify the root cause of chronic disease and co-create an individual lifestyle programme to optimise health. This could mean prevention, halting or limiting progression, or disease reversal depending on specific circumstances.*

## Slide 002: Please Note

The information presented here is based on professional

The information presented here is based on professional training, personal experience and interpretation of training, personal experience and interpretation of information from medical journals, articles, or books and information from medical journals, articles, or books and is for informational and educational purposes only.

It is not an attempt to diagnose or prescribe. People are advised to contact their primary or specialist health professional before making medical, nutritional, lifestyle or any other health-related changes.

## Slide 003: Presentation Outline

- Weight loss: How can we trust the science?
- Obesity the rise and rise of a modern epidemic
- The secret to weight loss
- The components of weight loss
- Top weight loss tips
- The number one weight loss tip

## Slide 004: Workshop Flyer

The science of weight management: beyond eating less and exercising more - How to Develop a Personalised Programme

One Day Workshop by Dr. John Mauremootoo & Julie Mauremootoo

New Paradigm Health

When: To be announced

Where: To be announced

Cost: £50 for the day including lunch, water, teas and coffee & workshop manual: £50 for the day including lunch, water, teas and coffee & workshop manual

- How to create a weight management programme that works for your unique circumstances
- works for your unique circumstances
- Diet wars —Atkins, Keto, low fat, Mediterranean, etc. Taking the best and ditching the rest
- How to make the energy balance equation work in your favour
- How to develop habits that stick
- How to create a weight management programme that works for your unique circumstances

*This presentation cannot go into all the details but does provide a sneak preview of our one-day workshop where we help people to incorporate the information presented here into a practical, sustainable, and personalised healthy weight loss and weight maintenance regime.*

## Slide 005: My Journey Where I have come from and where I am now

- Cambridge University Cambridge University - biology degree
- Southampton University - biology PhD
- University lecturer in biology – Southampton, Bournemouth, London, Mauritius
- Consultant in applied biology in 34 countries,
- Certified Naturopath
- Certified Functional Medicine Practitioner

*Here's a quick meander through my own personal journey in terms of my education and my development as a healthcare practitioner. It began about forty years ago when I began my studies in biology at Cambridge University. I went on to do a PhD in applied biology at the University of Southampton and, after completing various postdoctoral assignments, I became University lecturer in biology in universities in Southampton, Bournemouth, London and Mauritius. Over the years I have undertaken consultancies in applied biology in 34 countries.*

*Over this time I have become increasingly interested in human health and the root causes of chronic disease. This led me to become a certified naturopath - essentially somebody who uses natural means to prevent, arrest, and reverse diseases of all kinds; and a certified functional medicine practitioner. Functional medicine can be thought of as root cause medicine. It takes a forensic approach to tease out the root causes of the malaise rather than just simple treating the symptoms as conventional medicine tends to do.*

## Slide 006: Science not Stories

"There are in fact two things, science and opinion; the former begets knowledge, the latter ignorance." ~ Hippocrates (c. 460 c. 460 —c. 370 BC): Greek physician, often referred to as the "Father of Medicine."

*We are not looking at anecdotes but what has survived scientific scrutiny in the peer-reviewed literature.*

*People communicate through story-telling and that is how "myths" otherwise known as "conventional wisdom" and sometimes known as "common sense" take a foothold in our collective consciousness – as the saying goes, "when you repeat a lie often enough it becomes the truth". There is, however, a grain of truth to all these myths which accounts for their stickiness plus the fact that people like to hear good news about their bad habits. Hence the stickiness of ridiculous diets like the ice cream diet.*

*I love to quote Hippocrates, the Greek physician who is often referred to as the father of medicine, who stated "there are in fact two things, science and opinion; the former begets knowledge, the latter ignorance." That being said, we cannot ignore the fact that science is not without its own biases, and cherry picking the peer-reviewed literature enables us to support our prejudices and preconceptions with what appeared to be objective and authoritative sources of information. So to guard against cherry picking it is important to filter the evidence presented.*

## Slide 007: But Science is not Unbiased

So you need evidence filters

## Slide 008: Evidence Filters

Evidence => Evidence Filters => Provisional Conclusions

Sources: [TripleQuestTripleQuest](#) (CC--BYBY--SASA--3.0); [survivalcache.comsurvivalcache.com](#).

## Slide 009: Evidence Filters for 'Scientific' Health Claims

I use the following seven evidence filters to evaluate "scientific" health claims:

1. Does the claim make sense from an evolutionary perspective?
2. Is the claim congruent with the lifestyles of the world's healthiest Is the claim congruent with the lifestyles of the world's healthiest populations?
3. Is the claim supported by credible population-level studies?
4. Is the claim supported by credible experimental studies?
5. Are there plausible causal mechanisms to support the claim?
6. Are there conflicts of interest?

*3. We need this caveat: without succumbing to the "tyranny of the average." As we know that there is biochemical individuality.*

## Slide 010: The Rise of Obesity

## Slides 011: The Rise of Obesity

011: Source: The Economist (2003).

*The Economist (2003). The shape of things to come. Cover picture.*

*It is really not necessary to belabour this point as most of us are aware of the ongoing and worsening obesity epidemic. This graphic from the Economist in 2003 sums up the situation perfectly. And things have got worse since 2003!*

## **Slides 012: The Rise of Obesity**

Source: (OECD 2017).

*Note: Obesity defined as Body Mass Index (BMI) of = or >30kg/m<sup>2</sup>. OECD projections assume that BMI will continue to rise as a linear function of time.*

*Dotted line are projections from 2012-2014 (depending on the country).*

*Looking at the data on the worldwide rise of obesity we can see that, as in so many other respects, the United States leads the way. But a parallel process is going on in most other countries including those rapidly developing economies not represented in this graph. The dotted lines are projections from 2012-2014 (depending on the country). I am not aware of the actual data from most of the countries represented in this graph. However, I have seen the recent data for England and the projections are becoming a reality.*

## **Slide 013: The Secret to Weight Loss**

### **Slide 014: Maintaining a Prolonged negative energy negative energy balance**

*We all intuitively know the secret to weight loss – it's calories in versus calories out (CICO) or phrased in a slightly more highfalutin manner – maintaining a prolonged negative energy balance.*

### **Slide 015: CICO**

Calories in vs Calories out

*CICO provides the headline but the devil, as ever, is in the detail, so we require more information to be able to manipulate the weight balance equation in our favour.*

### **Slide 016: Do I look fat with these genes?**

Is it all to do with genetics?

### **Slide 017: Mostly not**

### **Slide 018: Genetics**

- There is no obesity gene
- We all have genes for obesity
- Over one hundred genetic markers have been linked to obesity
- Up to about 20% of BMI variation can be accounted for by genetics

*The search for an "obesity gene" has been a holy grail but at most genes account for about 20% of weight differences. Our genes have hardly changed over the past 200,000 years and yet the obesity rate has exploded during the past fifty years.*

Obesity is a normal response to an abnormal environment: Source: Locke et al. 2015.

*Every animal has a genetic tendency to gain weight: yet animals don't get chronically overweight in nature*

## Slide 019: How do we know that it is mostly not genetics?

- Migration studies
- Cross--border studies
- Adoption studies

Sources: CEP 2016, Roshania, Narayan & Oza-Frank 2008, Schulz & Chaudhari 2015.

*There are several lines of evidence that challenge the claim that obesity is all a matter of genetics:*

*Migrant studies have shown that the first generation of migrants from relatively poor countries to the west tends to be less overweight than their offspring despite the fact that there are no appreciable genetic differences between the generations.*

*Studies on ethnic groups with populations in different countries also bear this out. A famous example is that of the Pima Indians in North America, with populations on the Mexican side of the border being a healthy weight while those on the US side tend towards obesity.*

*A third line of evidence comes from studies on identical twins who have been separated at birth and grow up in different family environments and show contrasting weight gain patterns.*

## Slide 020: BUT

## Slide 021: Family background

It is estimated that family background explains c.25 - 80 % of variation in weight

Source: Elks et al. 2012.

*Studies on identical twins show the importance of family background independent of genetics. It is estimated that family background explains about 25 to 80% of variation in weight.*

## Slide 022: Some people are much more prone to weight gain than others

Researchers fed 16 individuals with 1,000 calorie daily per day in excess of calorie daily per day in excess of weight-maintenance requirements for 8 weeks.

### All volunteers gained weight

- Average weight gain was 4.7 kg
- Lowest weight gain was 1.4 kg
- Greatest weight gain was 7.2 kg = a **fivefold** difference

### All volunteers gained fat

- Average fat gain was 389 calories per day
- Lowest fat gain was 58 calories per day

- Greatest fat gain was 687 calories per day = a **twelfefold** difference.

Source: Levine et al. 1999.

*This study illustrates the fact that some people are more prone to weight gain than others and we will return to these results and their implications later in the presentation.*

## Slide 023: How do we explain the missing 5-60%?

## Slide 024: The Environment

Calories in	Calories out
Food quantity	Exercise & Movement
Food quality	Timing
Microbiome health	Metabolism--boosting Foods
Negative calories	Obesogens
Mindful eating	Sleep
Fasting	Psycho--social Stress

*The environment plays a critical role in weight regulation. In this diagram I have chosen to put some environmental factors on the 'calories in' side equation other than the 'calories out' side. However, the reality is more complex with multiple interactions which means individual factors are interlinked and can in fact be on both sides of the equation at once. The factors listed here are not exhaustive but do represent important environmental/lifestyle factors that we can control to a certain extent.*

## Slide 025: Working through Your Epigenetics

*A brief introduction to epigenetics will be given later in the presentation*

## Slide 026: OPTIMISING CALORIES IN

## Slide 027: EAT FEWER CALORIES

Calories in	Calories out
<b>Food quantity</b>	Exercise & Movement
Food quality	Timing
Microbiome health	Metabolism--boosting Foods
Negative calories	Obesogens
Mindful eating	Sleep
Fasting	Psycho--social Stress

## Slide 028: "Weight [re]Gain is Generally the Rule"

- Limiting the quantity of food consumed for a limited period of time is often referred to as "going on a diet"
- The diet industry is a financial goldmine with an annual turnover in Europe and USA of over £100 billion
- One-third to two-thirds of the weight lost is regained within 1 year and almost all is regained within 5 years.

Source: Dulloo & Montani 2015.

*Reducing the quantity of food eaten seems to be the obvious first step when it comes to losing weight. After all diets focus on eating less and exercising more, and indeed if you faithfully execute this mantra you will lose weight. However most people who go on calorie controlled diets tend to regain the weight.*

## Slide 029: The Biggest Loser Reunion Show

Sources: Fothergill et al. 2016, Hall 2013, Kolata 2016.

*The reality of weight gain being the norm is spectacularly illustrated by the fate of contestants on the popular reality show the Biggest Loser in which people undergo a 30 week programme of extreme dieting and exercise. It makes for great television, with people losing sometimes half their body weight in fat. However, it is telling that there is never a Biggest Loser Reunion Show because, as this graph shows, most contestants subsequently regain some, all, or even more of the weight that they lost while they were on the show.*

*13 of the 14 contestants studied regained weight in the six years after the competition. Four contestants are heavier now than before the competition.*

- *The picture is of Danny Cahill (purple line – the winner but he put back on over 100 lbs)*
- *Blue line: Erinn Egbert, the only contestant who has not regained weight*
- *Orange line: Rudy Pauls – regained most weight but lost it following bariatric surgery*

*A word on bariatric surgery. It can work but at a cost:*

- *The risk of the surgery itself*
- *Life threatening nutrient deficiencies*
- *Dumping syndrome*
- *Less effective against diabetes than diet alone*

Source Pop et al. 2018.

## Slide 030: Why does calorie control so often fail?

## Slide 031: Weight loss plateaus & Willpower depletion

*There are many reasons why calorie control so often fails but here I want to focus on two in particular: weight loss plateaus and willpower depletion.*

## Slide 032: The 3,500 Calorie Rule is Wrong

The 3,500 Calorie Rule

- A pound of fat has 395 grams of pure fat (87%)
- There are 9 calories in a gram of fat
- $99 \times 395 = 3,555$  (approximately 3,500)
- So with a 3,500 calorie deficit I will lose 1 lb
- With a 500 calorie daily deficit I will lose 1 lb per week.

Source: Greger 2019.

*Regarding weight loss plateaus, there is an implicit assumption that initial spectacular drops in weight will continue until the target weight is reached. This myth is perpetuated by the so-called 3500 calorie rule, outlined in this slide.*

### **Slide 033: A Weight Loss Scenario**

Abby, a 5 ft 4 inches tall woman who weighs 13 stone (BMI = 31), reduces her daily calorie intake by 500 calories (which is about the equivalent of one and a half bagels) to reach her target weight of 9 stone, 6 (BMI = 22.5) in less than one year.

*Applying the 3500 calorie rule to weight loss would result in the type of weight loss scenario represented in the graph. If Abby continued to reduce a daily calorie intake by 500 once her target weight was reached, she would, theoretically reach a weight of about two stone within three years!*

### **Slide 034: A Weight Gain Scenario**

Bill, a 6 ft tall man who weighs 12 stone (BMI of 22.7), increases his daily calorie intake by 500 calories to reach over forty-nine stone within ten years.

*Equally ludicrous is this application of 3500 calorie rule to a weight gain scenario. People intuitively know that both weight loss and weight gain is not a linear process.*

*49 stone for 6 ft tall man is a BMI of 93!*

### **Slide 035: A Weight Loss Scenario Revisited**

Abby, a 5 ft 4 inches tall woman who weighs 13 stone (BMI = 31), reduces her daily 5 ft 4 inches tall woman who weighs 13 stone (BMI = 31), reduces her daily calorie intake by 500 calories to reach her target weight of 9 stone, 6 pounds (BMI = 22.5) in six years.

*In this more realistic scenario, the rate of weight loss decreases over time and rather than reaching her target weight in less than one year, Abby takes six years.*

### **Slide 036: A Weight Gain Scenario Revisited**

Bill, a 6 ft tall man who weighs 12 stone (BMI of 22.7), increases his daily calorie by 500 calories to reach 15 & a half stone (BMI of 29.3) in ten years.

*In this way gain scenario Bill's status does change from normal weight over a period of 10 years, but we do not see the linear expansion portrayed previously.*

### **Slide 037: Why The 3,500 Calorie Rule is Wrong**

- Metabolic adaptation
- It takes effort to service the extra weight
- Our bodies defend themselves against weight loss with powerful internal signals, e.g. hormones and nutrients
- Metabolic slowdowns can persist.

Sources: Dulloo 2012, Fothergill et al. 2016, Greger 2019.

*It takes energy to maintain a heavy weight. For example, it takes more effort to climb stairs when you are heavier. An extra pound of fat needs to be serviced with one additional mile of blood vessels.*

## Slide 038: Willpower that prevailed during the initial process of weight loss withers away in an obesogenic environment

Willpower needs to be managed

- Be proactive (precommit)
- Set goals
- Meditate
- Breathe mindfully

Source: Baumeister & Tierney 2012.

*The image depicts a scene from the Greek Legend of Odysseus: Pre-commitment is what Odysseus and his men used to get past the deadly songs of the Sirens. He had himself lashed to the mast with orders not to be untied no matter how much he pleaded to be freed to go to the Sirens. His men used a different form of pre-commitment by plugging their ears so they couldn't hear the Sirens' songs. They prevented themselves from being tempted at all, which is generally the safer of the two approaches.*

*There is a whole science of willpower. Willpower can be exercised and like any muscle it will grow given the right exercise regime. However, willpower is not infinite, and it can become depleted for various reasons. One of these is weight loss plateaus as explained previously. Another is the fact that we live in an obesogenic environment with temptations everywhere. For these and other reasons, it is useful to employ a range of strategies to manage willpower. These include being proactive ("buying willpower at the store") by, for example, not having chocolate bars in the house, setting clear and specific long medium and short-term goals, developing a meditation practice, and mindful breathing which is an excellent way of centring yourself in the midst of chaos and temptation.*

## Slide 039: Top Tip for Eating Less

USE SMALL PLATES

Source: Marchiori et al 2012.

*This seems fairly obvious, but it is portion size is nonetheless a huge influence. study after study has shown that the smaller the container the less is eaten even if you don't finish the entire serving.*

## Slide 040: EAT LOW CALORIECALORIE - DENSITY, HIGH NUTRIENT-DENSITY FOODS

Calories in	Calories out
Food quantity	Exercise & Movement
<b>Food quality</b>	Timing
Microbiome health	Metabolism--boosting Foods
Negative calories	Obesogens
Mindful eating	Sleep
Fasting	Psycho--social Stress

## Slide 041: All Calories are not Created Equal

Apples vs. Oreos

## Slide 042: How many calories in a single Oreo?

## Slide 043: 50

## Slide 044: Oreos= 2,197 calories per pound

How many pounds of apples must you eat to consume 2,197 calories?

1. 4 pounds
2. 8 pounds
3. 13 pounds
4. 17 pounds
5. Zero, I'm getting the 2,197 calories Zero, I'm getting the 2,197 calories from the Oreos

*Assuming 280 calories per pound for apples.*

*One medium sized apple = 90 grams so 1 lb = three apples*

## Slide 045: 8 lbs

## Slide 046: All Calories are not Created Equal: Apples vs. Oreos

- Apples = 280 calories per pound
- Oreos = 2,197 calories per pound
- 1 lb of Oreos = 7.8 lbs of apples

Which is more tempting?

## Slide 047: Why are high calorie density foods density foods tempting?

*High calorie foods are so tempting because in nature resources tend to be scarce and fleeting. So if you discover a source of high calories such as a tree in fruit it is adaptive to gorge yourself. Because we have been able to concentrate calories in smaller and smaller packages, we have managed to create super-normal stimuli of the kind that would never have occurred in nature. Imagine the excitement that would accompany the discovery of an Oreo tree! So most of us don't have an effective off switch when it comes to calorie-dense foods. Rather, we have to use our intellects to override our instincts.*

## Slide 048: All Calories are not Created Equal: Apples vs. Oreos

- Apples = 280 calories per pound
- Oreos = 2,197 calories per pound
- 1 lb of Oreos = 7.8 lbs of apples

## Slide 049: Why are low calorie density foods filling?

## Slide 050: Low Calorie Density Food Is Bulky

Source: Hever 2020.

*Stretch receptors are located throughout the stomach. When they are triggered by food, they send signals to your brain to tell you to stop eating. With high plant consumption you can eat the most quantity for the least number of calories.*

## Slide 051: Calorie Density (calories per pound)

Source: Novick 2016.

## Slide 052: Eat Nutrient Dense Foods

Nutrient density = nutrients per calorie

High nutrient density foods:

- Vegetables, whole grains, beans and fruit

Low nutrient density foods:

- Refined grains, animal products, processed foods

CUT THE:

Calorie

Rich

And

Processed Foods

Sources: Novick 2016; Greger 2019.

## Slide 053: A Nutrient Dense Dietary Pattern

A **DIETARY PATTERN** that:

- Is rich in phytochemicals - vegetables, whole grains, beans and fruit
- Is high in fibre
- Has a low caloric density - bulky/ water-rich
- Has a low glycaemic load
- Is low in added fat/oils
- Is low in added sugar
- Is low in added salt
- Is low in caloric drinks and low calorie substitutes
- Is minimally processed
- Is satiating

Source: Greger 2019.

## Slide 054: Wholefood plant-rich food plate

Derived from: Davis & Melina 2014, Fuhrman 2011, Popper & Merzer 2013

- Sliver - Avoid: processed meat, non-organic animal products, GMO products, non-organic wheat products
- 8% - Limit: Alcohol, eggs, dairy, red meat, poultry, fish, oil, sugar, processed food
- 35% - Vegetables (30-50%): e.g. Kale, cabbage, broccoli, spinach, squash, peppers, onions, garlic, carrots, lettuce, cucumber, tomatoes
- 20% - Fruits (10-30%): e.g. berries, apples, oranges, peaches, grapes, pears, bananas
- 20% - Legumes (10-30%): e.g. Kidney beans, black beans, chickpeas, peas, lentils, soybeans, peanuts
- 8% Nuts & Seeds (5-20%): e.g. Chia seeds, flax seeds, pumpkin seeds, walnuts, cashews
- 30% - Starches (20-60%): e.g. whole wheat, brown rice, quinoa, potatoes, sweet potatoes

## Slide 055: Top Tip for Eating Less & Eating Better

A Dietary Manifesto in Eight Words

“Eat real food, not too much, mostly plants.” ~ Michael Pollan

Source: Pollan & Kalman 2011.

*The original rule is actually only seven words as Michael Pollan simply says eat food - the ‘real’ is implied. The ultra-processed foods that feature so heavily in many people’s diets in the West have been termed “edible food-like substances” by Pollan.*

*As we will see, there are no safe and effective dietary weight loss supplements, but low energy density/high nutrient density food are effective weight management aids. This reality was aptly summarised in a review of nutraceutical supplements undertaken by the Weight Management Center at Johns Hopkins University (Poddar et al. 2011) which ended with this statement:*

*“In closing, it is fitting to highlight that perhaps the most general and safest alternative/herbal approach to weight control is to substitute low energy density foods for energy density and processed foods, thereby reducing total energy intake. By taking advantage of the low-energy density and health-promoting effects of plant-based foods, one may be able to achieve weight loss, or at least assist weight maintenance without cutting down on the volume of food consumed or compromising its nutrient value.”*

## Slide 056: 100 TRILLION FRIENDS

Calories in	Calories out
Food quantity	Exercise & Movement
Food quality	Timing
<b>Microbiome health</b>	Metabolism--boosting Foods
Negative calories	Obesogens
Mindful eating	Sleep
Fasting	Psycho--social Stress

## Slide 057: The Microbiome

Source: Kristen Earle, Gabriel Billings, KC Huang & Justin Sonnenburg/Nikon Small World 2015.

## Slide 058: The most densely populated ecosystem known

Source: Kristen Earle, Gabriel Billings, KC Huang & Justin Sonnenburg/Nikon Small World 2015.

*The Microbiome, or strictly speaking the microbiota, comprise of all the microorganisms living in or on us and 100 trillion individuals the human microbiome constitutes the most densely populated ecosystem known. Originally thought to be pathological at best or neutral at worst, the microbiome is now known to be a crucial player in our overall health with vital roles to play in our biochemistry and physiology.*

## Slide 059: The microbiome pulls our strings

The microbiome plays a vital role in multiple physiological systems:

- **Digestion:** Gut throughput and completeness of digestion, digestive disorders - The primary functions of the gastrointestinal tract have traditionally been perceived to be limited to the digestion and absorption of nutrients and to electrolytes and water homeostasis.
- **Metabolism & weight management:** Type 2 diabetes, cardiovascular disease, metabolic syndrome
- **Immune system:** Autoimmune diseases, cancer, allergies, asthma
- **Nervous system:** Brain, behaviour, personality, depression, ASDs, MS, AD, PD

## Slide 060: Most of our genes are microbial

Your body has over 40 times as many microbial genes as human genes

*Our bodies are a community of organisms.*

***The Microbiome and what it does for us.***

*The total load is enormous. Total adult load is estimated at 1,800 genera, 40,000 species, 1-2kg in weight, 100 trillion in number (Frank & Pace 2008) and possesses 100 times the genes found in the human genome (Kurokawa et al. 2007).*

*When the human genome project was completed in 2003. Many people were surprised that such a complex animal as a human being contain so few genes (about 20,000 - 23,000 depending on the estimates used). This stands in sharp contrast with the number of separate microbial genes of the microbiome which number over one million. This gives us a lot of room to manoeuvre when it comes to manipulating our genes as the microbiome is amenable to change through diet and lifestyle in a way in which the gene own is not (although we have more power to change our epigenetics which will be discussed in more detail later in this talk).*

## Slide 061: The microbiome influences appetite regulation

Source: Sleeth et al. 2010.

*The role of the microbiome and health is a massive subject for the purpose of this presentation will be limiting our focus to the relationship between fibre, short chain fatty acids and appetite control via nutrient sensing (labelled as 'hormones' the sake of simplicity). The central premise behind the*

role of short chain fatty acids and appetite regulation is that in traditional systems food intake was tightly coupled with fibre intake, whereas this is often not the case nowadays because many diets contain a very low proportion of fibre.

Acetate, propionate, and butyrate are the three most common SCFAs

A proposed role of fibre and free fatty acid receptor 2 (FFA2) activation in maintaining energy homeostasis. This projected negative feedback mechanism assumes that an increase in food and energy intake within a traditional (fibre-rich) diet is associated with increased SCFA production. Thus, FFA2 is activated to signal satiety, increasing the secretion of peptide YY (PYY) and glucagon-like-peptide-1 (GLP-1). When a reduction in food is brought about, fibre intake consequently falls, and FFA2 activation is reduced.

## Slide 062: The microbiome influences appetite regulation

When food and fibre intakes are decoupled there is no corresponding increase in short chain fatty acid production with the accompanying satiety signalling. Thus prevailing appetite levels remain much higher than would otherwise have been the case.

## Slide 063: Top Tip for Microbiome Health

PRIORITISE DIGESTIVE HEALTH

“All Disease Begins in The Gut.” ~ Hippocrates

The dietary tip here could easily have been ‘eat more fibre’, which would be an excellent title for the shortest diet book in the world. However, I chose to emphasise the fact that all disease begins in the gut because it is such an important observation, not only for weight loss but for health in general.

## Slide 064: EAT NEGATIVE CALORIES

Calories in	Calories out
Food quantity	Exercise & Movement
Food quality	Timing
Microbiome health	Metabolism--boosting Foods
<b>Negative calories</b>	Obesogens
Mindful eating	Sleep
Fasting	Psycho--social Stress

The term ‘negative calories’ refers to the fact that eating some foods results in an overall calorie deficit. The one food that comes to mind is the oft cited example of celery containing fewer calories than it takes for our body to digest it.

## Slide 065: True or False

Celery contains fewer calories than our calories that our body uses to digest it.

## Slide 066: False

But celery can still be a negative calorie food or appetite suppressor

Source: Clegg & Cooper 2012.

Two stalks of celery (one cup) contain about sixteen calories which takes approximately fourteen calories to digest. So, in simple terms, celery consumption provides a surplus of about two calories.

*But if eating the celery means that you eat fewer calories of other foods then it could indeed be said to be a negative calorie food.*

## **Slide 067: How many calories in 266 grams of apple slices?**

## **Slide 068: It depends on when you eat them**

+128 or -187

*This is an example of what is known as preloading, where the food eaten before the meal acts as an appetite suppressor.*

Source: Flood-Obbagy & Rolls 2009.

*In this experiment 266 g of apple slices were fed to one group before an all-you-can-eat meal (the preload treatment) while the remaining participants ate the meal without preloading. Those who had not preloaded ate an average of 1024 calories while those who had consumed the apple slices ate 709 calories. Without taking into account subsequent consumption the number of calories in 266 g of apple slices is 128, but taking into account the subsequent meal, the apple slices can actually be said to contain -187 calories.*

## **Slide 069: Negative Calorie Soup**

Source: Flood & Rolls 2007.

*Similar results have been obtained with soups of various kinds*

## **Slide 070: Other Negative Calorie Foods**

- Green salads (without added oil)
- Ground chia seeds
- Ground flax seeds
- Cumin
- Nigella (black cumin)
- Saffron

Sources: Abedimanesh et al. 2017, Ahmad et al. 2013, Buckland, Finlayson & Hetherington 2013, Mohammadi-Sartang et al. 2017, Rolls, Roe & Meengs 2004, Sharma et al. 2009, Vuksan et al. 2017, Zare et al. 2014.

*Some of these foods can be eaten as preloads while others can be eaten during the main meal to suppress appetite, as well as providing delicious flavours.*

*Salads, but without any extra oil or other high calorie density accompaniments like cheese, make excellent pre-loads. If you prefer your salad dressed, you can use vinegar and lemon which have practically zero calories. The other foods in this list provide negative calories while being eaten with food rather than as a preload. Remember, to get the nutritional value of chia and flax seeds it is necessary to first grind them, otherwise they will just slip through the digestive system. Once ground, they need to be stored in the freezer to stop them going rancid.*

*Nigella (black cumin) is a common spice whose peppery flavour is popular in Indian and Middle Eastern cuisines, but it's also been prized for purported medicinal benefits. Described as a "miracle herb", — with mentions going back to the Old Testament (Isaiah 28:25, 27), Nigella was found*

cached in Tutankhamun's tomb, and the Prophet Muhammad apparently is quoted as saying it could "heal every disease except death."— Only in the last fifty years or so has it been under scientific scrutiny, culminating in more than a thousand published papers on the subject. Nigella or black cumin can be ground onto food using a pepper grinder.

Saffron works as a negative calorie food but might bankrupt you in the process!

## Slide 071: Top Tip for Optimising Negative Calories

PRELOAD LIKE THE FRENCH... BUT WITHOUT THE BREAD

## Slide 071: EAT MINDFULLY

EAT MINDFULLY

Calories in	Calories out
Food quantity	Exercise & Movement
Food quality	Timing
Microbiome health	Metabolism--boosting Foods
Negative calories	Obesogens
<b>Mindful eating</b>	Sleep
Fasting	Psycho--social Stress

The opposite of mindful is mindless and mindless eating has been linked with consuming excess calories.

## Slide 073: Eat Mindfully

Mindfulness: Moment to moment awareness and acceptance

Mindful Eating: Being fully present for a meal

### Eat slowly

- Guilty smoothies and the great soup paradox
- Straws vs spoons
- Spoons - does size matter?
- The twenty-minute rule gets us in tune with our body's fullness cues.

Sources: [Hogenkamp et al. 2010](#), [Kokkinos et al. 2010](#), [Martens & Westerterp-Plantenga 2012](#), [Paphangkorakit et al. 2019](#), [Smit et al. 2011](#).

Smoothies can be fattening, while soups (which in essence are hot vegetable smoothies) tend to be effective for weight loss. So why the contrast? It boils down to the fact that most people eat soup slowly and drink their smoothies fast. The speed factor is also the main reason why it's better to eat with a spoon than through a straw and if a smaller spoon tends to be more effective than a larger one as it slows down your eating pace. The 20 minute rule states that you should take twenty minutes or more to eat your meal as this allows the stomach's stretch receptors to kick in. The delayed activation of stretch receptors is the principal reason why eating slowly means you can feel full on less.

Prolonged meal duration provides time for our bodies' satiety signals to develop before too many calories have been eaten. In the words of Harvard's Healthy Weight Checklist: "Slowing down at meals can help avoid overeating by giving the brain time to tell the stomach when its had enough

food.” — *Our bodies are built to expect us to take our time when eating, as are adapted to extract calories from plants that were much tougher and fibrous than the domesticated varieties we eat today.*

## Slide 074: Eat Mindfully

### Eat without distractions

- **When we're distracted, we tend to eat faster and for longer**
  - People randomised to eat while watching TV averaged an extra slice of pizza with nearly three hundred additional calories.
- **Distracted eating may also affect subsequent consumption**
  - People playing computer solitaire while eating a fixed-calorie meal, ate nearly twice as many biscuits a half hour later, than those who did not. those who did not.
  - If you have people listen to an audio clip encouraging them to focus on the look, smell, taste, and texture of the food, they eat focus on the look, smell, taste, and texture of the food, they eat fewer biscuits hours later than those who ate in silence.

Sources: Bellisle & Dalix 2001, Blass et al. 2006, Mathieu 2009, Oldham-Cooper et al. 2011.

*Mindful eating involves slowing down, savouring every bite, and tuning into your body's fullness cues. We tend to eat faster and for longer when we're distracted. For example, researchers found that people randomised to eat while watching TV averaged an extra slice of pizza or 71 percent more macaroni and cheese, totalling nearly three hundred additional calories. This may help explain why one survey found overweight individuals reported they ate almost half their meals while watching television. Researchers found that on the weekends, about a quarter of a child's calories may be consumed in front of the TV.*

*Study subjects told to eat while giving their full attention to a radio conversation or a detective story ended up eating up to 77 percent more ice cream compared to those who ate without distractions. Distracted eating may also affect subsequent consumption. In one study people who played computer solitaire while eating a fixed-calorie meal ate nearly twice as many biscuits a half hour later.*

*Another way of tackling overeating through mindfulness is by sharpening the memory of each meal. Keeping a food diary can help in this regard.*

## Slide 075: Top Tip for Eating Mindfully

*Don't Eat Like You're Riding the Tour de France. Eating on the move and wolfing down food as if it is a race has become a widespread practice nowadays and can contribute to obesity.*

## Slide 076: GO FASTING

Calories in	Calories out
Food quantity	Exercise & Movement
Food quality	Timing
Microbiome health	Metabolism--boosting Foods
Negative calories	Obesogens
Mindful eating	Sleep
<b>Fasting</b>	Psycho--social Stress

## Slide 077: Eating Frequency Trends

*The average number of meals and snacks consumed by adults increased from 3 per day in 1977–78 to almost 6 per day in 2003–06.*

Sources: Fung & Moore 2016, Popkin & Duffey 2010.

*On the face of it fasting would seem to be an excellent weight loss method. You are consuming zero calories while still burning up calories in the minute to minute business of living. While fasting has become something of a weight loss and health trend, the pattern of eating among the general population in recent years has been the opposite with more frequent meals and snacks and shorter non-eating windows. However, in nature fasting is a normal occurrence and something to which our physiology appears to be excellently adapted.*

## Slide 078: Fasting is Natural

- Eating is essential but it stresses our physiology
- Fasting provides a physiological holiday
- All animals, including humans naturally go through prolonged periods without food and our bodies are adapted to this
- Fasting is an ancient healing practice
- Interest in fasting is growing and it has been used successfully for weight loss and to treat a variety of chronic diseases including heart disease, cancer, neurodegenerative diseases and type 2 diabetes
- Scientific research into fasting is in its infancy so the information provided is not definitive.

*This final point needs to be emphasised as fasting-related research has been relatively poorly funded. This might be something to do with the absence of a product to sell. However, it also needs to be remembered that all knowledge is provisional!!*

## Slide 079: Fasting is Ancient

A young boy fell to the ground and foamed at the mouth (probably epilepsy). Jesus' disciples tried to assist but could not help. In Mark 9: 28-29, the disciples asked Jesus why they had not been able to cure the boy, and he replied, "this kind can come out by nothing but prayer and fasting" (New King James Version).

Source: Carroll & Prickett 2008.

## Slide 080: Time-restricted Feeding, Intermittent Fasting and Prolonged Fasting

- There is no hard and fast dividing line between each category
  - Time-restricted feeding = feeding in a restricted time window
  - Intermittent fasting = skipping 1-3 regular meals
  - Prolonged fasting = skipping 4+ regular meals.

## Slide 081: The Physiology of Fasting

Changes in fuel sources as fasting progresses

Source: McCue 2012.

Fasting can be divided into the following three phases based on the fuel sources used by the body: 1) the feeding phase; 2) the glycogen/fat/gluconeogenesis phase, and; 3) the fat/ketone phase. The duration of each stage will vary.

### **1) The feeding phase (0-6 hours after eating)**

For up to six hours after a meal the body converts the macronutrients (carbohydrates, proteins and fats) contained in the food into glucose which the body uses as its main energy source. Any excess glucose is stored as glycogen in the liver and muscle cells or as fat.

### **2) The glycogen/fat/gluconeogenesis phase (3-6 hours to 3 days after eating)**

From three to six hours after a meal the body begins to convert glycogen into glucose. The glycogen is normally exhausted within the first 24 hours of fasting. Fats are broken down into glucose through gluconeogenesis (making new glucose) as the glycogen stores are being depleted, with approximately 50% of energy derived from fat within ten hours of fasting. Amino acids, the building blocks of proteins, also undergo gluconeogenesis.

People get concerned that fasting will result in muscle wasting. There is a small amount of muscle loss during fasting, once glycogen is exhausted as the body uses protein to produce glucose. But the body is intelligent and prefers to burn energy stored as fat rather than use protein, most of which is essential for the maintenance of structure and function. As Jason Fung eloquently states - To burn muscle for energy would be like storing firewood and then, as soon as cold weather hits, chopping up your sofa and throwing it into the fire. Furthermore, when the body does burn protein, it prioritises the breakdown of unessential or harmful proteins over essential proteins in a process called autophagy. The ability of fasting to boost autophagy is one of the main explanations for its healing power.

### **3) The fat/ketone/gluconeogenesis phase (from 2-3 days after eating)**

As the fast progresses, the liver converts fats into fatty acids and ketone bodies (ketones). Fatty acids can be burned directly by most tissues but not by the brain. Ketones, along with glucose, can be used by the brain. This state of elevated ketone levels, known as ketosis, kicks in for women after about 48 hours and for men after about 72. Therefore, unless you are on a ketogenic diet, which I strongly advise against for most people, you are unlikely to get into ketosis on an intermittent fast. Ketones suppress your appetite, so hunger is usually minimal from about day three of a fast. Ketones also promote a sense of wellbeing, clarity, and revitalisation, which is often felt from the third day of a fast. There are other physiological benefits of spending short periods in ketosis which include improved cellular function, improved immune system function, and reduced oxidative stress.

Although ketone production provides most of the energy used by the brain during this phase, some glucose, is still required. This is produced by gluconeogenesis. The body conserves muscle mass by minimising the use of protein for energy and producing high levels of growth hormone.

## **Slide 082: Benefits for Weight Loss**

The body can lose c.1/4 kg of fat per day when fasting

There are many examples of fasting as a successful way of losing weight

A regular intermittent fasting regime offers the potential for sustainable weight management because the body does not fully compensate for the missed meals.

However, the results of fasting for long term weight maintenance are as variable as they are for most weight loss approaches

Fasting is not a magic bullet for weight loss, or any other health benefit, and its long term effectiveness depends upon the implementation of effective post-fast lifestyle interventions.

Sources: Ayyad & Andersen 2000, Drenick & Johnson 1978, Dulloo & Montani 2015, Fredricks 2008, Johnstone 2007, Johnstone et al. 2002, Purcell et al. 2014, Stewart & Fleming 1973, Varady et al. 2013.

### **Slide 083: The tale of Angus Barbieri who fasted for more than a year more than a year - and lost nearly 20 stone**

Sources: Stewart & Fleming 1973; Brady 2016.

Back in 1965 Angus Barbieri, a 27-year-old man from Dundee Scotland who worked in his parents' fish and chip shop, weighed over 32 st 8 lb (456 lb). After seeing his doctor about his morbid obesity Angus began to fast under medical supervision. The fast was initially meant to last only a few days. The weight began to melt off, so Angus continued for a few days more, and a few days more, and a few days more... Until those few days added up to 382 days on only water, vitamin and mineral supplements, and black tea, black coffee and soda water. Upon eating his first meal in over a year (one boiled egg and some bread with butter) Angus stated "It went down OK. I feel a bit full, but I thoroughly enjoyed it." By this time he had lost 19 st 10 lb (276 lb) and weighed 12 st 12 lb (180 lb). Five years after the fast, Angus Barbieri's weight remained around 13 st 8 lb (190 lb). Angus stopped working at his parents fish and chip shop which had gone bankrupt during his fast.

### **Slide 084: Fasting, Autophagy Stem Cells, Rejuvenation, Epigenetics & Weight Loss**

### **Slide 085: Epigenetics - Why we don't grow teeth in Why we don't grow teeth in our eyeballs**

- All our cells contain a copy of all our genes (our genome) but most genes are switched off at any one time.
- Epigenetics determines which genes are turned on and which are turned off.
- Epigenetics is the bridge between our genes and the environment.
- The younger we are the more epigenetic flexibility we have.

Sources: Carey 2012; [anthonymychal.com](http://anthonymychal.com)

*The photograph is of two genetically identical cloned agouti mice. The yellow mouse is prone to obesity and a range of chronic diseases while the brown mouse is not. The mother of the yellow mouse received a sub-optimal diet during gestation while the mother of the brown mouse received the recommended diet for healthy mice (standard mouse chow). The diet sent signals to the cells to turn genes on and off. The process of turning genes on and off is the province of epigenetics.*

### **Slide 086: Epigenetics - Our cells specialise over time**

Sources: Sandoval et al. 2014; [tanyajawab-biologi.blogspot.com](http://tanyajawab-biologi.blogspot.com).

*This figure illustrates the phenomenon of cell specialisation as we develop, from an undifferentiated cell with the potential for a variety of outcomes, to differentiated cells which carry out specialised*

functions. The cell at the top of the hill has the potential to become one specialised cells at the bottom – such as red blood cells, muscle cells, nerve cells, and white blood cells and the cells in turn become part of the body's system of organs. Under normal circumstances, these differentiated cells cannot “turn back the epigenetic clock” and become undifferentiated cells.

## **Slide 087: Epigenetics - Our metabolic flexibility Our metabolic flexibility reduces with time**

*The bent tree illustrates the fact that our genes are moulded through our environment and that our fate becomes entrenched over time. In the case of the tree, even if the prevailing wind changes the tree's shape will remain the same unless something radical is done such as cutting back the tree trunk to allow it to coppice and shape itself to the altered environment. An analogous process in humans would be to restore stem cells to increase the options for differentiation through turning genes on and off. Fasting is the believed to aid in this process of stem cell production thus increasing our metabolic flexibility which otherwise will reduce over time.*

## **Slides 088 -091: The Window of Opportunity**

*This metabolic flexibility can be thought of as a “window of opportunity” which progressively reduces over time, but which can be restored to a certain extent through regular episodes of fasting which helps to turn back the epigenetic clock.*

## **Slide 092: Fasting can help restore metabolic flexibility**

The Window of Opportunity

## **Slides 093 -095: The Window of Opportunity**

## **Slide 096: Fasting - turning back the epigenetic clock**

Sources: Sandoval et al. 2014; [tanyajawab-biologi.blogspot.com](http://tanyajawab-biologi.blogspot.com).

## **Slide 097: Top Tip for Fasting**

BUILD UP SLOWLY

*The photo is of the magnificent Sagrada Familia in Barcelona, a structure that has been built gradually over a period of more than 100 years.*

*Many people wince when the prospect of fasting is first suggested, believing that they are unable to go for a day or more without eating. However, as outlined previously, fasting is a very normal state in nature. However, unless undertaking a medically supervised fast to tackle a chronic health issue, it is advisable to build up slowly, starting with time-restricted eating and skipping a meal or two and building up to a prolonged fast in which the benefits of the fat metabolism, ketosis, and autophagy are maximised.*

## Slide 098: OPTIMISING CALORIES OUT

Calories in	Calories out
Food quantity	<b>Exercise &amp; Movement</b>
Food quality	Timing
Microbiome health	Metabolism--boosting Foods
Negative calories	Obesogens
Mindful eating	Sleep
Fasting	Psycho--social Stress

## Slide 099: Exercise and weight loss - the surprising truth

*Exercise is the second part of the “eat less exercise more” mantra.*

## Slide 100: Is exercise alone a very effective way to lose weight?

## Slide 101: MOSTLY NOT

## Slide 102: One of the most common weight loss misconceptions

- Most calories are consumed on basic maintenance
- Physical activity is the icing on the cake
- We have a lot more control of the calories in side of the equation
  - We can eat between 0 and 10,000 calories per day
  - Even an hour a day of moderate exercise will only consume about 300 calories which is about 220 net calories
  - Some of this “gain” lost by exercise--stimulated increases in appetite
  - Some of this “gain” is lost by post-exercise sloth
  - Meta analyses indicate that regular exercise alone translates into an annual weight loss of about two pounds (30% of CICO calculations).

Sources: Fedewa et al. 2017, Shaibi et al. 2015, Shaw et al. 2006, Speakman & Selman 2003.

*Most people believe that exercise is a “very effective” way to lose weight. This has been labelled as one of the most common misconceptions in the field of obesity. Yet virtually all formal programs place strong emphasis on the value of exercise as a mode weight-loss despite the evidence from both long-term and short-term studies.*

*Studies on using exercise alone as a weight loss method found that people lost only about three pounds on average over a period of six months (Williamson, Atkinson & Batterham 2018). Those exercising in conjunction with food limitation (“eat less and exercise more”) did better than those who only ate less but the difference averaged a couple of pounds (Shaw et al. 2006).*

*The effectiveness of exercise in weight loss appears to be even worse in trials lasting for six months or longer. However, much of this is down to non-compliance. A 2018 review found that those who exercised experienced marginally more weight loss than those who did not (Foright et al. 2018). The*

*fact that the weight loss was less than predicted by CICO calculations may have something to do the muscle gain that usually accompanies increased exercise, and muscle weighs more than fat.*

### **Slide 103: Calorie consumption of selected activities**

- One hour of brisk walking (200 calories net) = small slice of pizza
- One hour of yoga (150 calories net) = one medium latte
- Nine holes of golf in 1.5 hours (300 calories net) = one jam donut
- One hour of tennis (350 calories net) = two pints of bitter
- One hour of housework (100 calories net) = two Oreos
- Sex - six minutes (14 calories net) = two McDonald's fries.

Source: Greger 2019.

*These figures reinforce the message that unless you're exercising like an Olympic athlete or a Biggest Loser contender you are unlikely to lose much weight through exercise alone.*

*Lager has more calories than its counterpart. It comes in at an average of 227 calories per pint.*

### **Slide 104: Is exercise a very effective part of a weight loss strategy?**

### **Slide 105: YES**

### **Slide 106: Exercise as part of a weight loss & weight maintenance strategy**

- Metabolic boost after exercise
- Effect on weight maintenance
- Exercise as a subset of movement
- Effect on overall health
  - Blood sugar levels
  - Bone & joint health
  - Improved mental health
  - Balance
  - Reduced cancer risk
  - Reduced cardiovascular risk

Sources: Foright et al. 2018; Warburton & Bredin 2017.

Despite the fact that exercise is not as important for weight loss as many people think, it is extremely important for all-round health as part of a movement regime and can play a marginal role in weight loss and an important part in weight maintenance.

### **Slide 107: Most people move more than they exercise**

### **Slide 108: Most people move more than they exercise**

This is the place with the most wiggle room on the right hand side of the CICO equation

Sources: Shook 2016.

## Slide 109: Some people are much more prone to weight gain than others

Researchers fed 16 individuals with 1,000 calorie daily per day in excess of weight-maintenance requirements for 8 weeks.

### All volunteers gained weight

- Average weight gain was 4.7 kg
- Lowest weight gain was 1.4 kg
- Greatest weight gain was 7.2 kg = a **fivefold** difference

### All volunteers gained fat

- Average fat gain was 389 calories per day
- Lowest fat gain was 58 calories per day
- Greatest fat gain was 687 calories per day = a **twelvefold** difference.

*It is estimated that heredity explains 40–70 % of variation in weight with up to 20% of this due to genetics so where is the remaining 20-50% coming from?*

*This brings us back to the 1999 study by Levine et al. showing the fivefold difference in weight gain and the twelvefold difference in fat gain.*

Source: Levine et al. (1999)

## Slide 110: Some people are much more prone to weight gain than others

Source: Levine et al. 1999.

*It seems that about 50% of the variation in fat gain can be explained by heat generated by additional movement, which illustrates that day-to-day movement can be a significant player in weight loss.*

## Slide 111: Top Tip for Movement

MAXIMISE OTMs

Sources: : The [MuscleheadGym](#); Morishima et al. 2016.

*Learn to fidget*

*OTMs or opportunities to move refer to occasions throughout the day when you can make the choice to maximise movement rather than take the 'easy' (movement minimising) option. This includes things like taking the stairs rather than the escalator, making a conscious decision to tap your feet while listening to music, physically going to the neighbouring office to discuss a work-related issue rather than sending an email or getting on the phone, parking your car some distance from your destination rather than finding the nearest available parking spot or better still walking or cycling to your destination. OTMs also involve maximising your range of movement by doing things like squatting, reaching for objects high on the shelf, and standing on tiptoes. The accumulation of OTM's in one's daily life helps to stave off reduced levels of mobility that otherwise come with age. Ageing can be characterised as a progressive movement loss of movement until one moves no more, a state which is otherwise known as death!*

## Slide 112: WHEN TO EAT

Calories in	Calories out
Food quantity	Exercise & Movement
Food quality	<b>Timing</b>
Microbiome health	Metabolism--boosting Foods
Negative calories	Obesogens
Mindful eating	Sleep
Fasting	Psycho--social Stress

## Slide 113: Optimal time of day for eating

Our internal body clocks massively influence our metabolic processes

- Breakfast like a king, lunch like a prince, dine like a pauper?
  - 1,200 calorie meal at 8 am takes 300 calories to digest
  - 1,200 calorie meal at 8 pm takes 200 calories to digest
    - Bo et al., 2015
- Our bodies like to eat in the earlier part of the day
  - King-Prince-Pauper (700, 500, 200) => more weight loss, better blood sugar control and lower cardiac risk than Pauper-Prince-King (200, 500, 700)
- Implications for night-shift workers
  - Avoiding food at night can help minimise the negative consequences.
  - Jet lag and “social jet lag”.

Sources: Bo et al. 2015, Jakubowicz et al. 2013, Mattson et al. 2014, Parsons et al. 2015, Sehgal 2017.

*Billions of years of evolution have adapted our bodies to the daily (circadian) cycle of light and dark, so it is no surprise that nearly all of our tissues and organs have their internal clocks which strongly influence our behavioural patterns, biochemistry and physiology (Sehgal 2017).*

*It appears that our bodies invest calories in the morning by building our glycogen reserves to fuel our muscles. It takes further energy to break these molecules into glucose later in the day. At the same time our bodies are primed to be active, so are adapted to utilise our fat stores. In the morning our muscles are at their most sensitive to insulin which helps to build up the glycogen reserves. Conversely in the evening our muscles become more insulin-resistant so extra blood sugar from a meal is stored as fat. In the evening we get higher blood sugar and insulin spikes than we would in the morning when eating the same meal, so eating the majority of our calories earlier in the day has both weight loss and blood sugar control benefits.*

## Slide 114: Top Tip for Timing

IMPOSE AN EATING CURFEW

*Avoid eating for at least two hours before bedtime*

Source: Brown et al. 2017.

*Not only does late-night eating reduce calorie utilisation, but it can also delay sleep onset. This may be due to the heating effect of eating (diet-induced thermogenesis) which runs counter to the drop in core body temperature which normally occurs in the late evening and is thought to be a signal that it is time for bed.*

## Slide 115: METABOLISM-BOOSTING FOODS

Calories in	Calories out
Food quantity	Exercise & Movement
Food quality	Timing
Microbiome health	<b>Metabolism--boosting Foods</b>
Negative calories	Obesogens
Mindful eating	Sleep
Fasting	Psycho--social Stress

## Slide 116: Metabolism--boosting Foods

- Ephedra
- Tobacco
- Peppers
- Vinegar
- Quercetin (from many plants including onions, apples, grapes, berries, broccoli, citrus fruits, cherries, tea)
- Resveratrol (from grapes, red wine & Japanese knotweed)
- Ginger
- Garlic
- Ginseng
- Black and green tea
- Sulforaphane (from broccoli, cabbage, etc.)

Sources: Grahame Hardie 2016, Kawabata et al. 2006, Kondo et al. 2009, Seamon & Clauson 2005, Shekelle et al. 2003, Woolf et al. 2005.

*Ephedra and tobacco can boost metabolism which can assist weight loss, but they are most certainly not recommended because their negatives far outweigh any positives. The food items listed in black are safe if consumed moderately.*

*Ephedra is an example of an effective weight loss supplement that has unacceptable side-effects. It has been used for thousands of years in China as a treatment asthma and other ailments. It stimulates the release of noradrenaline which helps asthmatics by dilating their airways. A meta-analysis of placebo-controlled trials showed it to result in about two pounds of weight loss a month (Shekelle et al. 2003). By the late 1990s, millions of people were taking it. However, ephedra causes undesirable effects of increased noradrenaline like elevated heart rate and blood pressure, with chronic use leading to strokes, heart attacks, and death (Woolf et al. 2005).*

## Slide 117: Top Tip for Metabolism-boosting Foods

SOME IS GOOD BUT MORE IS NOT NECESSARILY BETTER

This point reiterates what was emphasised previously – that metabolism boosting foods should be consumed in moderation.

## Slide 118: Obesogens - it's not just food that it's not just food that makes us fat

Calories in	Calories out
Food quantity	Exercise & Movement
Food quality	Timing
Microbiome health	Metabolism--boosting Foods
Negative calories	<b>Obesogens</b>
Mindful eating	Sleep
Fasting	Psycho--social Stress

## Slide 119: Obesogens

Definition: Non-food chemicals that we absorb that can cause obesity

- Study of 8 animal species (pets, feral species & lab animals) that live in close association with industrialised societies
  - All showed increasing body weight over several decades
  - 8 million to one odds of this being due to chance
  - Obesogenic chemicals are a possible cause.

Sources: Klimentidis et al. 2011; [www.express.co.uk](http://www.express.co.uk).

*This study (Klimentidis et al. 2011) really caught my eye because prior to reading this I had assumed that pets were getting fatter because we were feeding them more, and, in the case of dogs at least, they were doing less exercise (cats, I would imagine, would be taking care of themselves in that department). I had not given the matter much consideration but an increase in weight in feral animals associated with human habitation could be explained by greater food availability because of increasing food waste. However, the increased weight of lab animals who are maintained under strictly controlled regimes is more difficult to explain in terms of diet and movement alone.*

## Slide 120: Possible Obesogens

Sources: Legler et al. 2015; [www.express.co.uk](http://www.express.co.uk).

Various categories of obesogens have been identified

- Pesticides, e.g. organotins, DDT
- Plastics, e.g. BPA, phthalates
- Toxic metals, e.g. mercury, lead and aluminium
- Medications, e.g. corticosteroids, antidepressants, diabetes drugs
- Food additives
- Fragrances, e.g. in scented candles, synthetic incense sticks, etc.
- Cleaning products
- Artificial sweeteners
- Cosmetics.

## Slide 121: Actions of Obesogens

Obesogens exert their effects by a variety of means

- Hormone mimics
- Hormone disruption, e.g. sex changing sea snails
- Affect the microbiome
- Act as novel compounds that the body does not recognise
- Affect formation and function of fat cells.

Sources: Legler et al. 2015; [www.express.co.uk](http://www.express.co.uk).

## Slide 122: Top Tip To Minimise Exposure to Obesogens

AVOID PUTTING PLASTIC INTO OR ONTO YOUR BODY

*By avoiding plastic you will be helping your body and the wider environment. The map shows major ocean circulatory systems in which plastic has accumulated. These vast islands of plastic are obvious consequences of throwing away products that do not effectively biodegrade, but the effects of plastic pollution are evident pretty much everywhere, albeit in less visually spectacular manifestations.*

## Slide 123: SLEEP - THE SECRET SAUCE

Calories in	Calories out
Food quantity	Exercise & Movement
Food quality	Timing
Microbiome health	Metabolism--boosting Foods
Negative calories	Obesogens
Mindful eating	<b>Sleep</b>
Fasting	Psycho--social Stress

## Slide 124: How much sleep do most people need?

- 5 hours
- 6 hours
- 7 hours
- 8 hours
- 10 hours

## Slide 125: How much sleep do you really need?

*The National Sleep Foundation Sleep Time Duration Recommendations:*

- *Newborns (0-3 months): 14-17 hours*
- *Infants (4-11 months): 12-15 hours*
- *Toddlers (1-2 years): 11-14 hours*
- *Preschoolers (3-5): 10-13 hours*
- *School age children (6-13): 9-11 hours*
- *Teenagers (14-17): 8-10 hours*
- *Younger adults (18-25)*
- *Adults (18-64): 7-9 hours*
- *Older adults (65+): 7-8 hours*

Source: Hirshkowitz et al. 2015.

## Slide 126: The average Briton gets how much sleep per night?

- 5 hours
- 6 hours
- 6 hours & 30 minutes
- 7 hours
- 7 hours & 30 minutes
- 8 hours & 30 minutes

Source: The Sleep Council 2013.

## Slide 127: 6 hours & 30 minutes

Source: The Sleep Council 2013.

## Slide 128: Sleep and Weight

Among the functions of sleep that are weight related:

- Clearance of toxins
- Increased appetite - Sleep deprivation on average leads people to overeat by about 180 - 560 calories a day
- Increased consumption of unhealthy food
- Night time munchies - linked to endocannabinoid 2 levels
- Increased insulin
- Increased lethargy
- Hormonal changes.

Sources: Hanlon et al. 2016, St-Onge et al. 2016, Xie et al. 2013.

## Slide 129: Insufficient sleep

Dominant male hormone = testosterone

Dominant female hormone = testosterone

Aromatase in subcutaneous fat, converts testosterone into oestrogen => manboobs

Loss of 1 hour/night = 14.3 lbs of fat per year

Nature's two cruellest jokes on man: 1) As we get fatter, we get more aromatase in subcutaneous fat which converts testosterone to oestrogen; 2) brain doesn't have testosterone sensors only sensors for oestrogen so it thinks that we don't need to make more testosterone.

Sources: Parsley 2017; [MailOnline 2008](#).

## Slides 130: Insufficient sleep

The orange is meant to denote cellulite, so it looks like nature is cruel joke is not just confined to men!

Fall in testosterone leads to increased cellulite – muscles that hold your skin to the fascia beneath them relax and the fat beneath them shows up.

Source: Parsley, 2017.

## Slide 131: Top Tip to Optimise Sleep

MAKE YOUR BEDROOM A SLEEP SANCTUARY

Morgan Freeman is the personification of cool, dark, and mellow. Your bedroom should be kept at a relatively cool temperature, it should be dark, and uncluttered. It is important to keep phones, tablets, computers, and televisions out the bedroom. If for whatever reason you need to keep your phone switched on and in the bedroom, then you should place it as far as way as possible from your head.

Source: [deviantart.com](#).

## Slide 132: Bonus Tip: Avoid Sleeping Pills

"After 35 years, the author is still looking for any evidence of objective functional benefits [of sleeping pills]. In a letter to Sleep Medicine, readers were asked to inform us if "any U.S.-licensed hypnotic ever objectively improved any aspect of insomnia patients' daytime function or any aspect of general health." So far, nobody has informed me of any such evidence." ~ Daniel Kripke: Licensed physician certified by the American Board of Psychiatry and Neurology and an Emeritus Professor of Psychiatry at the University of California, San Diego.

Source: Kripke 2018.

## Slide 133: PSYCHOSOCIAL STRESS

STRESS

## Slide 134: STRESS <=> UNHEALTHY WEIGHT

Calories in	Calories out
Food quantity	Exercise & Movement
Food quality	Timing
Microbiome health	Metabolism--boosting Foods
Negative calories	Obesogens
Mindful eating	Sleep
Fasting	<b>Psycho--social Stress</b>

*The term “unhealthy weight” applies to both being overweight and underweight And stress can lead to unhealthy weight gain and weight loss depending on the disposition of the person concerned.*

## Slide 135: STRESS

- Too much
- Too little
- Too new

*From a physiological and biochemical standpoint the body treats all stress the same whether it’s physical chemical or psychosocial in origin. To some extent stress is one of those Goldilocks phenomena - you don’t want too much of a certain stimulus or too little – you want things to be “just right”. That’s the situation with things to which have shaped our evolutionary history like physical activity, certain plant toxins, and hot and cold temperatures. However there is now a third category of stressors – those novel compounds and situations for which there is no evolutionary precedent, such as some of the obesogens outlined previously. This too much, too little, too new triumvirate is what I use to classify stresses of all kinds but, in this section, we will be focusing on stress as it is commonly described – psychosocial stress.*

## Slide 136: STRESS <=> UNHEALTHY WEIGHT

When stressed, people tend to:

- Be less physically active
- Eat more
- Eat more unhealthily (“comfort food”)
- Put on relatively more belly fat (linked to cortisol)
- Become trapped in vicious circles

Sources: Jackson, Kirschbaum & Steptoe 2016, Stults-Kolehmainen & Sinha 2014, van der Valk, Savas & van Rossum 2018, Yau & Potenza 2013.

The effects of acute stress on food preferences has been demonstrated in a variety of laboratory experiments. When people are randomised into groups given solvable and unsolvable puzzles, the latter are more likely to subsequently choose more calorie-rich food options. In the same vein, stressors such as public speaking, cold exposure and the act of watching distressing scenes on film such as traffic accidents and sexual harassment can shift taste preferences towards more calorie rich options.

## Slide 137: Top Tip to Optimise Psychosocial Health

KNOW WHERE YOU STAND

*This concept of three circles – the circle of control, the circle of influence, and the circle of concern, was first introduced to me through my work in project monitoring and evaluation. Its practical applications to this discipline was that you could only judge a project success by how it executes the parameters within its control and the degree to which it successfully influences people and situations that lie within its circle of influence. This contrasts with the situation in which projects may be unfairly judged by changes that are beyond their control and influence but with which they are concerned.*

*This situation has strong parallels in our personal lives where we only have limited control and influence but there are all sorts of issues going on in the wider world about which we are concerned and about which there is very little we can do. This tendency to dwell on issues beyond our control has become accentuated in recent years by the growth of social media and the 24-hour news cycle that focuses endlessly on the issue du jour.*

### **Slide 138: The Serenity Prayer**

Grant me the serenity to accept the things I cannot change,  
The courage to change the things I can,  
And the wisdom to know the difference.

*The need to know where our power lies and the imperative of working in this sphere is poetically illustrated by the Serenity Prayer, famously used by Alcoholics Anonymous.*

### **Slide 139: MY NUMBER ONE WEIGHT MANAGEMENT TIP**

Everybody will have their own personal number one tip or tips for weight loss, a fact which illustrates that everybody's weight loss and weight maintenance regime will be different depending on their own individual circumstances.

### **Slide 140: DODGE THE PLEASURE TRAP**

*My own personal favourite is based upon Doug Lisle and Alan Goldhamers' excellent book: The Pleasure Trap – Mastering the Hidden Force that Undermines Health and Happiness.*

Source: Lisle & Goldhamer 2006.

### **Slide 141: Evolution Image**

*This engaging and easy to read book is based on the premise that much of our behaviour is based upon traits which would have been favourable to the survival of our ancestors (both human and nonhuman) over billions of years of evolution, during which scarcity was prevalent, our abilities to store food and hoard resources were limited, and laboursaving devices were basic or non-existent.*

Source: <http://deskarati.com/>

### **Slide 142: The Pleasure Trap**

- The pursuit of pleasure
- The avoidance of pain
- The minimisation of energy

*Under such circumstances, our behaviour has been shaped by three fundamental forces: the pursuit of pleasure (“if it feels good do it”), the avoidance of pain (“get out of hurtful situations by fighting, freezing or fleeing”), and the minimisation of energy (“if you don’t need to do it then don’t do it”). This speaks to an era that would have no comprehension of the concept of a “fun run”. In the same vein, it is unlikely that Palaeolithic people would have had a word “exercise”.*

*In the industrialised world where food is always available, where labour-saving devices have reduced the need for physical activity, and in which entertainment is on tap all day long at the flick of the switch these three forces can combine to create the pleasure trap.*

## **Slide 143: The Pleasure Trap**

Homer Simpson is the poster child for the pleasure trap.

## **Slide 144: The Dietary Pleasure Trap**

This graph illustrates the dietary pleasure trap with dietary type on the horizontal axis and level of pleasure on the vertical. When eating a healthy diet (*real food, not too much, mostly plants*) pleasure levels are mostly in the normal zone with the odd period of enhanced pleasure when you encounter some tasty morsel such as ripe fruit or freshly cooked wild animals.

You are then transported into the world of junk food with tastes enhanced by sugar salt fat and flavourings meticulously concocted to maximise your taste sensations. The level of pleasure rises to greater levels than you have ever experienced before. You are informed that a diet of junk food will be bad for your health and will lead to a shorter lifespan and is a greater potential to develop a range of chronic diseases. But that’s all in the future and our present selves tend to think of our future selves as a different person so you ignore the advice and decide that the pleasure in the now is worth a little bit of pain a long time down the road.

Unfortunately (or fortunately depending on your point of view), the supernormal levels of pleasure cannot be maintained because your body becomes habituated to the new stimuli, so pleasure levels fall but for a while they still remain in the enhanced pleasure zone.

But pleasure levels will continue to fall while eating a junk food diet because in addition to the habituation you are now starting to feel the health consequences of junk food diet. Your recall is not perfect, but you are still dimly aware of a previous time when you ate a more healthy diet and felt better than you do now so decide to go back to your former way of eating.

But rather than re-instituting your former levels of pleasure, the new situation sees pleasure levels taking a nosedive because your sense of taste has been moulded by the hyper-stimulating junk food diet which obliterates the taste sensations of many health foods some of which are characterised as “rabbit food”.

But the great thing about tastes is that they can be rapidly (re)acquired. Taste buds only have a lifespan of a few days and within a period of several weeks your mouth will have a completely new set of taste buds which have now become accustomed to healthy food and can appreciate the subtle and delicious flavours. Knowing this fact can help you to get through those miserable early days of healthy eating and over time, as long as you avoid frequent forays into the world of junk food, you will come to prefer a healthy eating plan.

## **Slide 145: The way forward - Developing Healthy Habits**

Understanding the pleasure trap and how to dodge it is a major asset when it comes to developing healthy habits.

## Slide 146: Workshop Flyer

The science of weight management: beyond eating less and exercising more - How to Develop a Personalised Programme

One Day Workshop by Dr. John Mauremootoo & Julie Mauremootoo

New Paradigm Health

When: To be announced

Where: To be announced

Cost: £50 for the day including lunch, water, teas and coffee & workshop manual: £50 for the day including lunch, water, teas and coffee & workshop manual

- How to create a weight management programme that works for your unique circumstances
- works for your unique circumstances
- Diet wars —Atkins, Keto, low fat, Mediterranean, etc. Taking the best and Atkins, Keto, low fat, Mediterranean, etc. Taking the best and ditching the rest
- How to make the energy balance equation work in your favour
- How to develop habits that stick
- How to create a weight management programme that works for your unique circumstances

*I do not have the time to go into detail here about ways in which one can develop healthy habits, but we cover this extensively in our practical one-day workshop*

## Slide 147: Questions/Observations, Surprises, Confirmations

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