BTNacademy

MODULE 1

THE FUNDAMENTAL PRINCIPLES OF WEIGHT MANAGEMENT

1. MODULE 1: THE FUNDAMENTAL PRINCIPLES OF WEIGHT MANAGEMENT

1.1. Module aims

- To introduce students to nutrition and health, and explain what health is
- To describe calorie balance, and explain its role in weight management and health
- To explain a calorie surplus and deficit and show how many popular diets make it appear like they have 'the secret'
- To provide different methods to assess calorie needs, in yourself and clients
- To describe and explain the degree of accuracy it is possible and necessary to achieve when counting calories

1.2. How can we impact health with nutrition?

Before we answer the above question, it's important to define what health really is. According to the World Health Organisation, health is:

"A complete state of mental, social and physical wellbeing, not just the absence of illness or disease". This is a very complex statement. Looking at it from the point of view of nutrition, we can take each of those terms to describe different aspects of what eating can mean in a modern environment. For example:

Mental wellbeing: Does the impact your nutrition is having on your body and bodyweight cause you to have poor self-image? Is your approach to food restrictive to the point of causing you anxiety? Is your approach complex to the point of causing you stress? Does your nutritional approach lead to large swings in mood or energy? Does it impact your sleep negatively? Do you have addictive tendencies or binging episodes?

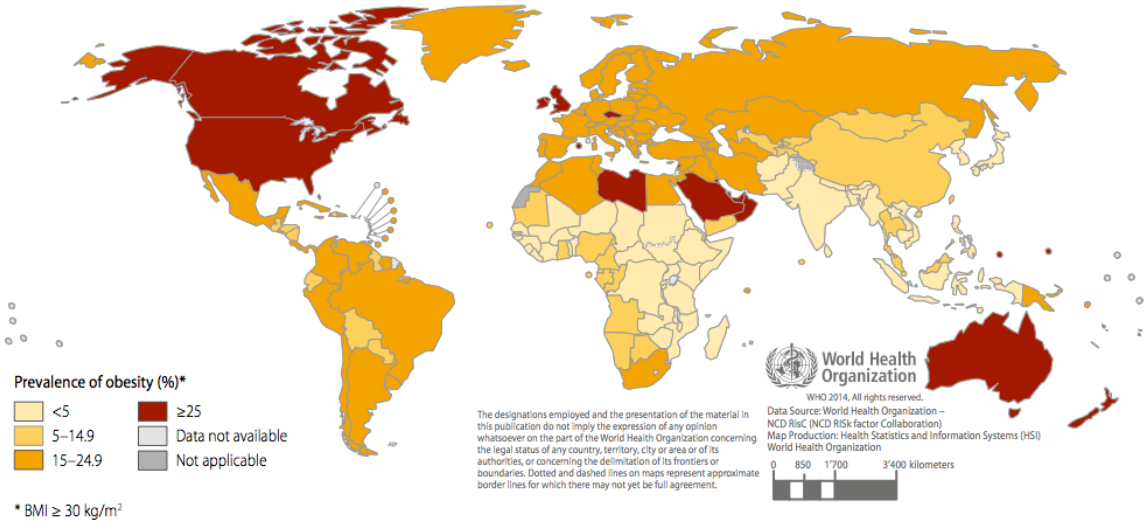
Social wellbeing: Are you able to enjoy eating out at a restaurant with friends? If your social circle are drinking alcohol, are you equipped to deal with that in a manner which doesn't upset your mental wellbeing (whether or not that includes drinking yourself)? Are you able to relax at family dinners, especially over holiday periods? If you are unable to control your food intake, do you withdraw from events? Does your dietary approach leave you unable to maintain a relationship?

Physical wellbeing: Are you over or underweight? Are you malnourished in any way? Are your teeth healthy? Is your blood pressure within normal parameters? What about your lipid markers? Do you have healthy and stable blood sugar levels throughout the day? Are you able to exercise to the levels recommended by the WHO or do you feel too fatigued? Is your digestion poor? Do you feel bloated often, gassy or nauseous?

As you can see, although poor nutritional practices can lead to, contribute to or exacerbate serious issues like diabetes, cancer, morbid obesity and other conditions, there are other ways that poor nutrition or a poor approach to nutrition can impact your health. Some of these can be difficult to spot without looking, even in yourself.

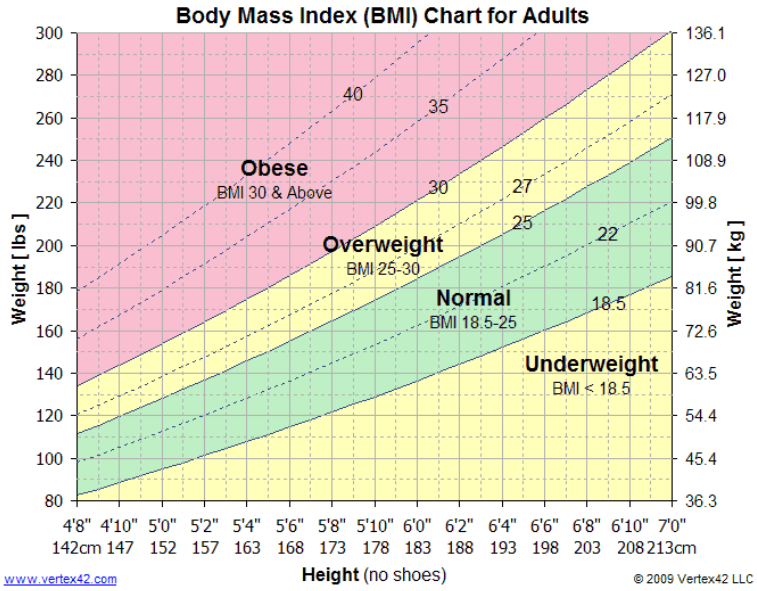
These issues are perhaps more important now than they ever have been. According to WHO statistics: **"In 2014, more than 1.9 billion adults, 18 years and older, were overweight. Of these, over 600 million were obese".** That figure has **doubled** since 1980 meaning that lifestyle related illness (closely tied to food intake) is not only a global epidemic, it is rapidly increasing its impact from generation to generation. See below for "Age-standardised prevalence of obesity in men aged 18 years and over BMI ≥30kg/m^2), 2014" from the WHO.

Fig. 1



Each person has an 'ideal weight' which is the weight estimated to place them at the lowest risk of encountering physical ailment. This is typically illustrated by their Body Mass Index (BMI) which is calculated by dividing your weight in kilograms by your height in metres, then dividing that answer by your weight again. An ideal BMI would be between 20 and 25 for any given height, so a 5 foot 10 male would ideally be between 59 and 77 kilograms.

Fig. 2



The BMI scale often gets discredited in the fitness industry because it doesn't account for muscle mass, but this isn't necessarily the case. A person who has been training somewhat inefficiently, even for a few years, probably hasn't gained nearly enough muscle to offset the BMI's relevance. Therefore, the vast majority of people (basically, everyone other than the very well trained) can safely consider BMI to be a relevant scale for them and can look to it to suggest a rough estimate of a healthy weight. Furthermore, the scale isn't a judgement of anything – having a BMI score above what it should be does not make you a bad person, doesn't make you objectively 'out of shape', and it doesn't necessarily mean that you are unhealthy right now either. The BMI scale is an indicator of risk factors for illness, and in general people who fall way above the healthy range are indeed at greater risk of heart problems including high blood pressure, regardless of what that weight is made up of.

If you are significantly above your ideal weight and very muscular, either you aren't as lean as you could be which brings us back to the above, or you are using certain substances which themselves carry risks. This is a digression, however. The point is that there is an ideal weight for every individual, and this will fall somewhere close to the range which is suggested by the BMI scale (it's a range rather than a fixed number to allow for changes in frame and bone density, for example). The further you are away from this range, the greater your risk of becoming ill at some point in the future, either due to that extra weight or the lifestyle which has led to it.

Note: Being underweight is not much better either. Chronic under-nutrition leads to increased risk of nutrient deficiencies, low energy availability (which causes issues with your hormones and immune system), and potential loss of muscle mass, bone density and even organ mass. Being underweight can be just as lethal as being overweight.

The first step to improving any given situation is arming yourself with the tools and knowledge to deal with it. In terms of improving your health you need to know how to achieve and maintain a healthy weight first and foremost, but you also need to know how to eat, drink and live in a manner which maximises your health at that bodyweight because, there is a lot that can go wrong without you getting too heavy or light, as a result of poor nutrition.

1.3. What is important?

Nutrition can be looked at as an amalgamation of a multitude of topics, rather than as one single entity. It would be a mistake, however, to give all of these topics the same amount of 'mental air time' as they are not of equal importance. You only have a certain amount of time and mental energy with which to consider your nutritional practices on any given day, and by focusing too much on the small details you risk losing sight of the bigger picture.

So, what does that big picture look like? There are numerous ways to illustrate this and we are going to use a triangle which was first popularised by Eric Helms (to our knowledge) because nutritional importance is primarily hierarchical. This means that not only is level one more important than level two, but that without level one the rest of the hierarchy doesn't really 'work' and would fall down. For example, looking at the pyramid below you could be optimally hydrated and making excellent food choices while consuming an ideal amount of

protein, but if your calorie intake isn't where it should be, then you're still going to be unhealthy in the long run due to gaining or losing excessive amounts of weight, and you will not have the success you expect with your body composition.

Fig. 3

You will notice that dietary adherence is the bottom tier. This will crop up a lot throughout this course because it is the single most important factor for long-term success. Adherence underpins everything, but it works both ways and the levels higher up in the pyramid can influence those lower down. The way you approach your nutrition, your food choices, calorie level, macronutrient distribution and fibre intake will directly impact on your adherence, and adherence will in turn, by definition, affect your decisions higher up the pyramid day-to-day. Starting out on a path to improved nutrition is often exciting for people because we are anticipating looking and feeling better, being more confident and (at the root of it all) feeling happier. But 3 weeks down the line when your end-goals haven't magically appeared and you have only the day-to-day activities of your approach to consider, it can often become a little deflating.

People often want a flat stomach or a 6 pack, they want to look great on the beach and feel amazing about themselves, but all that is months away and the reality is that **right now** you're stood in your kitchen drinking a smoothie. You aren't close to your goal yet so you aren't motivated by that, and the excitement of starting something new is gone, too. If the process itself doesn't excite you, you will not stick with it long enough to reach the outcome.

Dietary adherence is something that most people are aware of as important. Unfortunately, we often only pay lip service to this when coming up with an approach. We've all said at some point "I have to be able to stick to it", and **we all know** in theory that someone who crash diets will more than likely gain their weight back and **we all know** that 'it's supposed to be a lifestyle change', but do we really act upon that?

Dietary adherence simply means consistently being on track which of course, in the context of the above definition of health, means that we need to define a track which maintains your social life, reduces stress on your part and doesn't become overly restrictive while also

helping you keep your overall physical health in top condition. This requires some degree of flexibility, but we will get to that later. For now, remember that adherence underpins everything and we will return to this in a later module.

As a final note on the pyramid of nutritional importance, we would like to indicate that some aspects, for example your micronutrient intake, are incredibly important for health. In fact, if you are chronically deficient in some micronutrients (that's vitamins and minerals) you could die – but they appear higher in the pyramid because if you take care of the lower levels (food choice and macronutrients, primarily) then micronutrients will more or less take care of themselves. This pyramid loosely indicates what the key factors are in achieving health through nutrition, but it more accurately depicts the amount of energy and effort you should give over to each aspect of your nutritional approach to make sure you are doing everything 'right'. The amount of energy and time you need to spend on something doesn't necessarily relate to its importance – how often do you consciously make sure that your rate of breathing is appropriate for your oxygen needs?

In short, pay attention to the lower levels of the pyramid more than those above, because it's the former that gives you the most return on investment. Once you have it in line, the latter only needs to be given a small amount of thought as it'll be largely taken care of by default. Of course, it tends to be the things higher up the pyramid which appear to be more interesting because they come closer to being a 'secret ingredient'.

Human beings have evolved to be problem solvers – if you give someone a task, while some of their brain is concentrating on doing it, the other will be almost automatically trying to come up with an idea to make it easier. This is why we use tools. Unfortunately, this leaves us vulnerable to falling for promises of 'quick fixes' and 'magic bullets' when it comes to our nutrition. We would love it if there was a one-line answer to improving your health, but it simply doesn't work that way.

So – let's look at the second wedge of our pyramid.

1.4. What is a calorie?

We imagine that you have heard the word 'calorie' before, but before we can go much further it's probably a good idea to define the term. Calories are measurements of energy, in much the same way as millilitres are a measurement of liquid or centimetres are a measurement of distance. As such, a calorie has a specifically determined and universally agreed value which is 4.184 joules. A calorie is a very small unit, though, so the unit used to determine energy for our purposes here are kilo calories, often represented as kcal or Calories with a capital C, which is equivalent to 1000 calories or 4180 joules.

This unit is the amount of energy required to raise the temperature of 1kg of water by 1 degree Celsius.

It's important to remember that calories have a well-defined and universally agreed value because, ultimately, a calorie is the same regardless of its source. It's a lot more complex than that in practice, as you'll see, but this is worth remembering from the outset.

1.5. What is calorie balance?

Simply put, calorie balance is achieved when your calorie intake from all sources matches your total calorie expenditure, over a given period of time, typically thought of as a 24-hour day, but sometimes considered over longer periods, such as a week.

1.6. Calorie intake

Your calorie intake is the amount of energy you get from food and drink. This can often be very difficult to determine precisely for a number of reasons:

- This would require precise measurement and tracking of everything we eat and drink. This is possible, and we will discuss later why this could even be recommended for a lot of people for various periods of time and for various reasons, but it requires a certain amount of skill, and is by no means a straightforward process
- Food labels, as you will again discover in a later module, are not 100% accurate, and these variances can vary wildly depending on where you are shopping, how many people the food comes into contact with (which increases the occurrence of human error) and how many ingredients the food has
- Even if you tracked every morsel of food, and compared this to data which was accurate to the joule for the specific foods you eat (consider here that two seemingly identical potatoes, of the same variety but grown in different soil will have slightly different nutritional contents due to the nutrients available to them in that soil), you wouldn't be getting the whole story. Your calorie intake is more accurately considered to be your calories 'absorbed' rather than just calories consumed. Around 2-10% of calories consumed will be lost in faecal matter because absorption is affected by food choice (for instance, higher fibre intakes reduce absorption) preparation techniques, the microbes living in your gut, your genetics, and a number of other things, some of which will be discussed in a later section of this module

With that said, it is **very** possible, and even easy (when you know how) to 'ballpark' your calorie intake by measuring things or even using good practiced judgement. While it's impossible to be precise it's practically possible – even easy – to be consistently, roughly accurate. This wouldn't pass in a scientific lab, but it's certainly good enough for most to control their weight.

1.7. Calorie expenditure

Your calorie expenditure is often thought of as the amount of calories 'burned' through exercise, but there is a lot more to the equation than this. Your calorie expenditure (known as Total Daily Energy Expenditure or TDEE) is made up of a few different aspects, explained below.

1.8. RMR aka Resting Metabolic Rate

You have probably heard of BMR before; it is an abbreviation of Basal Metabolic Rate. 'Metabolism' is the aggregation of all of the complex chemical reactions which occur within every cell of your body in order to maintain your existence, and your Basal Metabolic Rate is the minimum amount of energy which is required to fuel all of those reactions, measured while you are asleep. Those reactions and processes include things like protein turnover, which is where proteins are broken down and re-synthesised in every cell of your body, bone metabolism which is a similar process within your skeleton, action potential activity in your nervous system and filtration in your kidneys amongst literally thousands more. As you can see, you don't actually have to **do** anything for this energy to be used.

RMR is very similar, but it is measured while you are awake, and seeing as most research is done using RMR we will talk about that instead.

Note: Your RMR is usually a little higher than your BMR, by 10% or so. It may or may not surprise you to know that your RMR will make up somewhere around 60-70% of your total energy expenditure if you are moderately active. This will, of course, go up or down if you are very inactive or an athlete respectively, because other factors start to make a bigger difference. But the key thing to note here is that you cannot directly affect to any substantial degree the largest component of your daily calorie expenditure.

This is not to say that this number is static as it can be affected by certain environmental factors including calorie balance (broadly speaking, it will go up and down slightly when you are eating more and fewer calories than you require, respectively), hormonal interactions, medications/drugs, your age and health status. It is, for most practical purposes, however, more or less static and determined by your bodyweight and body composition (which describes your balance of fat mass and everything else). In some extreme or unusual cases RMR could be wildly different to what is expected, but that's beyond the scope of this course.

Each tissue within your body requires a different amount of energy to maintain itself day-to-day. Fat tissue, far from being inert or dead, requires about 4.5kcal per kg per day (so 90kcal if you have 20kg of fat mass, roughly) whereas muscle requires about 13kcal which is of course more, but not so much more that we should buy in to the idea that you radically speed up your metabolism by building muscle, because you don't. On top of that, your liver requires 200kcal per kg whilst your heart needs a humongous 400kcal per kg. Of course, you have significantly more skeletal muscle than liver or kidney tissue and as such your muscle takes up a lot more total energy per day than these smaller organs. Bones require energy too, as does every single tissue in your body at different rates. When all of this is added together, you have an approximate figure for your RMR.

As you can probably work out, your BMR/RMR will vary wildly due to differences in tissue mass. If you're tall or short, carrying a lot of bodyfat or very lean, carrying a lot of muscle mass or very slight, your BMR will be affected and you will probably sit outside of the standard estimated ranges because your tissue distribution is unusual. On top of this, around 15% of RMR is not predictable from tissue mass, although you would expect that it should be. This

fast or slow metabolism phenomenon seems to be natural genetic variance and there is very little you can do about it, but when put into real numbers, the difference is not going to be huge. If two people should have an RMR of 1750kcal, that means that the variance is around 260kcals at a maximum, or 130 calories up or down on their calculated RMR. While some people may indeed have slower metabolic rates than others, the difference equates to a large banana or less, and therefore general estimates can be used and considered to be 'pretty good'. We'll show you how to make these estimates in a later section of this module and then we'll show you how to verify them later in the course.

1.9. TEF: Thermic Effect of Food

Stepping away from the area that you are likely familiar with, let us look at the remaining components of TDEE, starting with TEF. The Thermic Effect of Food (TEF), which is the amount of energy required to process and store the energy containing substrates we consume, referred to as the macronutrients: protein, carbohydrate and fat. The TEF for each macronutrient is different, being estimated at around 20-35% for protein, 5-15% for carbohydrate and 5-15% for fat, though fat is generally considered to land at the lower end of that range and carbohydrate towards the higher end. As a side note, ethanol, which is the alcohol we drink also provides calories and its TEF is around 20%.

TEF is represented as a percentage of total calorie intake, generally rounded to around 10% of the calories you eat, and it typically makes up a very small amount of your total intake.

It's worth noting however, that those who are in a calorie deficit, who are insulin resistant or who have unfortunate genetic predispositions, may have a lower TEF than those who for whatever reason, tend to have a higher TEF per calorie they eat. This could potentially explain a small amount of the difference in calorie intakes needed between individuals, but it is impossible to measure in the real world, and as such we won't talk too much about it during this course beyond making you aware of the fact that it's included in later calculations.

1.10. EAT: Exercise Activity Thermogenesis

Exercise Activity Thermogenesis (EAT) is probably the first thing that people think of when they think about their daily calorie expenditure and is almost always the first factor that people consider when they are looking to manipulate their expenditure up or down. This is, however, not a great idea.

EAT will generally come to 10-30% of your TDEE depending on your overall activity levels (though for typical modern exercising individuals who exercise for an hour 3-4 times per week this figure is going to be somewhere around the 10-15% mark) and the particular mode of exercise that you partake in. For example, resistance training burns perhaps 100-300 calories per session depending on your volume and training density (reps/sets per unit time). A high-volume session involving squats, deadlifts, leg presses and lunges, for example, will burn somewhere around the higher end, whereas a heavy squat session alongside sets of two on the deadlift may be equally tiring but won't actually burn that many calories because most of the time is spent resting.

Note: The same principle applies to HIIT training which may be beneficial for other reasons but isn't great for increasing calorie expenditure because you spend a good chunk of your time resting.

In terms of increasing calorie expenditure, by far the most effective manner is by engaging in cardiovascular activity for prolonged periods of time, but even then, a 60 minute moderate intensity session (you cannot perform high intensity exercise for 60 minutes) would be unlikely to burn more than 600 calories, which equates to around half a pint of high quality ice cream and around 15% of a typical male's daily expenditure. EAT can absolutely make a difference to your TDEE, but how large that difference is tends to be overestimated, especially seeing as increases in EAT tend to lead to fatigue, which will negatively impact our next factor.

1.11. NEAT: Non-Exercise Activity Thermogenesis

Non-Exercise Activity Thermogenesis (known as NEAT and sometimes referred to as Spontaneous Physical Activity or SPA) is the movement you do during the day which doesn't constitute formal exercise done for its own sake – this includes commuting to work, walking around your house/office, fidgeting, playing with the kids and even low-level activities like shaking your leg while sat on the couch and changing your sleeping position.

NEAT accounts for a **huge** amount in the TDEE variance between individuals. Consider two individuals who have the same statistics, but one of them works in an office and the other works as a postman. For simplicity let's assume they would have a TDEE of 2400 if they were completely sedentary – 100kcal per hour.

The office worker will be burning approximately 8% above TDEE per hour at his job shifting position, thinking and typing. That means that each hour of his 8-hour day he burns 108 calories, totalling 864 calories from 9-5. The postman would be walking an average of 1-2mph during that time (accounting for breaks, for example) which equates to an increase of around 100-150% according to Levine et al, meaning that he'd be burning at least 200 calories per hour, or 1600 calories during his workday. As you can see, with a small change in lifestyle, increased NEAT can easily result in a TDEE difference of 1000 calories or more between individuals, which is huge.

Increasing NEAT is often associated with improved body composition and health, whereas increased EAT is typically not. This could be because increased EAT is generally associated with a decrease in NEAT, and as such, we would say that daily activity is typically far more important than strict exercise when it comes to predicting total daily energy expenditure. We will return to the impact that NEAT can have on weight loss later in this module.

1.12. How can we determine calorie needs?

To determine how many calories you need there are a few different methods. The most accurate way is to record everything that you eat over a few days while you are not gaining or losing weight, then take an average of what calorie amount you have consumed during that time. This works great for those who are used to measuring their calorie intake and who

have a relatively consistent diet (basically, people who are doing all of this anyway) but for people new to the concept this has some issues.

Primarily, the simple act of focusing upon something alters its behaviour, be that an animal, a sub atomic particle, or you when you're rummaging in the fridge. If you just happen to have stayed weight stable by accident over the last few weeks then suddenly start to record your intake you will probably change what you're doing. Not only that, people are terrible at recording their food. We'll cover this a lot more in the module about tracking food, but for now just trust us that this process is great in theory, but less so in practice.

A much faster and potentially more accurate means (given the above) is to use what we know about the factors which make up RMR and then estimate that. When we consider the average weight of all different tissues in a given individual and the average amount of calories those tissues require per kilogram, we can get to a pretty good number for estimating it, which makes the whole thing a lot more straightforward.

There are many complex formulae which you can use to estimate your BMR/RMR (depending on the formula) with the most popular probably being the Harris Benedict Equation which looks like the below:

- **Men:** BMR = 88.362 + (13.397 x weight in kg) + (4.799 x height in cm) – (5.677 x age in years)
- **Women:** BMR = 447.593 + (9.247 x weight in kg) + (3.098 x height in cm) – (4.339 x age in years)

These look a little intimidating but with a calculator they are simple to use. With that said, you can get to a very close figure to what you'd get by doing the above by simply doing the following:

- **Men:** Bodyweight in kilograms x 24
- **Women:** Bodyweight in kilograms x 22

The difference in both is mostly because men carry more lean tissue at a given level of 'leanness', as women's essential fat (the amount of bodyfat they have to carry to stay alive) is far higher. A man and a woman who are at the same level of visual leanness, will have a bodyfat % which differs by about 8-10%, with the man being lower. This doesn't really mean anything, but it's good to note for reference, and it explains why the BMR of the two is different in part. The remainder of the difference isn't entirely clear, but it follows logic that the reasons are primarily hormonal.

Note: For individuals who are extremely lean, extremely overweight or muscular, very old, peri or post-menopausal, or suffering from certain health issues relating to metabolism (thyroid issues, for example, or PCOS) the figures may be different. These individuals should use the more complex formulae to get a good estimate, but really estimating the TDEE of these individuals is beyond the scope of this course and in fact practically very difficult to do.

After you have estimated someone's BMR, your next step is to account for the activity which you might take part in during the day. To do this, we can use the following 'activity modifiers':

- If someone is largely sedentary, perhaps someone with a sedentary job who doesn't really engage in activity at all, an estimate of their daily kilocalories needed would be: **BMR x 1.2**
- If someone is a light exerciser (2-3 exercise sessions per week) and has an inactive office job, or they engage in little to no exercise but have a moderately active job like a hairdresser, their daily kilocalories needed would be: **BMR x 1.375**
- If someone is a moderate exerciser (2-3 sessions per week) and they also have a moderately active job like a hairdresser, or if they engage in heavy exercise (3-5 sessions per week) while working an office job, or if they have a very demanding job but don't formally exercise daily, kilocalories needed would be: **BMR x 1.55**
- If someone did a lot of heavy exercise (6-7 exercise sessions per week) and a moderately active job, or moderate exercise and manual job, their daily kilocalories needed would be: **BMR x 1.725**
- A very heavy exerciser, twice per day exercise, or heavy exercise and a manual job, their daily kilocalories needed would be: **BMR x1.9**

Note: THESE ARE ESTIMATES. If you aren't sure, go with the lower figure as most people overestimate their calorie expenditure and we will show you later in the course how to verify the figure you come to. This calculated figure is an average across 7 days, and as such would be eaten on both training and resting days.

Practical Example: An 85kg male would have a BMR of around 2040 calories according to our shortened calculation (weight in kg x 24). If he lifted weights 4 times per week, took a long walk on his lunchbreak and stayed reasonably active during the weekend he would comfortably fall into the category of 'moderately active', so we would take this 2040 figure and multiply that by 1.55 to get an estimated TDEE of 3162. This could be rounded to 3100-3200kcals. As this calculation is an estimate, and because (as you will see in the food label module) food labels are not precise either, it's a good idea to use a calorie range instead of an exact figure to make dietary adherence far easier.

1.13. Weight maintenance, loss and gain

The above figure is an estimate of what is referred to as your calorie ' maintenance'. In order to gain weight, one must increase intake to overcome this maintenance and eat in a calorie surplus (typically just referred to as a surplus) and must eat below this maintenance in order to create a calorie deficit (or just deficit) in order to lose weight.

- **Calories in > calories out** = Weight gain because that extra energy must be stored

- **Calories in < calories out** = Weight loss because your body requires energy from somewhere and if it's not being supplied through the diet, it must access stored energy which comes from fat, muscle and other tissues

Simple, right?

Yes, but also no.

The human body is a dynamic being, and it has a number of fail safes and mechanisms in place to allow it to maintain a state of equilibrium known as homeostasis. As you increase or decrease your energy intake your body receives a number of signals that something is going on, with leptin being the main one we will focus on here. Leptin is a hormone with a multitude of functions, but in this context, it is released from fat tissue to 'let your body know' whether or not you have eaten enough. Eat a lot, leptin secretion increases, with the opposite being true if you under eat. Leptin is so impactful, that a disregulation in either its secretion or in the sensitivity of receptor sites that allow cells to register its presence, is one of the key factors in obesity. Simply, if your leptin secretion or sensitivity is lower than it should be, your body doesn't get the message that you have eaten enough, and your desire to eat more will be increased.

While the calories in vs. calories out theory of weight management is undeniable, it's not as simple in practice as this statement would have you believe. Each time you eat away from this maintenance level, your body will combat it somewhat in the following ways.

1.14. Resisting weight gain

Unfortunately, we have to say from the outset that the mechanisms by which you resist weight gain are FAR less efficient than their opposites. This makes a lot of sense from an evolutionary standpoint – at no other point in history has long-term overconsumption been an issue, and therefore it could be argued that our current environment is drastically different to the one in which we evolved. Food availability, marketing, calorie density and palatability is significantly higher than ever before, and we aren't equipped to deal with it as efficiently as we'd perhaps like. There **is** some amount of fightback, however.

As you eat too much, a number of different things happen:

- Reduced hunger/appetite
- Increased thermogenesis (you get really hot to waste energy)
- Decreased energy absorption (that 2-10% mentioned earlier goes up)
- Increased energy, which can be used for increased subconscious NEAT production or improved exercise performance, in turn increasing calorie burn (of course, this is a very valid reason for increasing food intake in the first place if your gym performance matters to you)

Unfortunately for us, the above is largely mitigated by modern lifestyles. Hyper-palatable foods which cause extremely large reward responses in your brain and very calorie dense, low fibre processed foods make it easy to overcome a reduction in appetite while 'cancelling

out' reduced absorption. Liquid calories make this a lot worse and of course office jobs, internet shopping and on demand TV make it easy to keep your overall activity nice and low.

The magnitude to which the above all affect you as an individual is very difficult to predict. That guy you know who 'can eat anything and never gains weight' almost always has a very wasteful metabolism which means he'll fidget like crazy. On top of that, he will generally eat a lot for a few days but also regularly skip meals and be very inconsistent with his food intake, the result being he moves more and eats less than may be immediately obvious. In overfeeding twin studies where they take genetically identical twins and keep them in a ward with other twins to feed them up and see what happens, the difference in weight gain between the twins is tiny whereas the difference between pairs is huge – some gain a lot of weight, others lose weight, all while eating an identical calorie surplus. This shows that your genetic makeup has a huge impact on how you will respond to a given food intake, and of course beyond that your genes and your mentality will impact your response to the modern food environment.

When you think about it, a combination of the modern world and our inability to handle it makes it difficult to argue that it's surprising we have the obesity issue that we do.

1.15. Resisting weight loss

On the other end of the spectrum, the amount that your body will fight back against when it comes to fat loss is also very dependent on you and your genetics, much in the same way as your genetics determine how much your body fights against weight gain. Some people will lose weight very easily when underfed, not really feeling any negative effects, but some people can find it a lot more difficult. Unfortunately, as we have said, the mechanisms for resisting weight loss are a lot more effective than those resisting gain because famine has been a part of our evolutionary history for millions of years, since we resembled fish and even further beyond that. Place an efficient mechanism for resisting weight loss in an environment which almost encourages overeating and not moving and you have a problem.

The things which happen to resist weight loss include:

- Increased hunger and decreased satiety (hungrier, and less able to get full)
- Your muscle cells get more efficient and waste less energy, reducing your BMR and making you colder
- Increased food-focus. Psychologists have discovered that you will notice and think about food more often, which can lead to increased cravings
- Reduced ability to exercise and therefore decreased performance in the gym or on the field
- Nutrient absorption in your intestines increases in efficiency
- Reduced NEAT due to lethargy, both consciously (I can't be bothered to walk, I'll drive) and subconsciously (you fidget less)

This last factor is theoretically the greatest reason for the difference in weight loss between individuals, but fortunately it **can** be fought back against in ways which we'll talk about in the module on tracking and measuring. For now, the simplest way to fight back against the fight back, is to control the magnitude of your surplus or deficit.

If nothing else, we hope this section goes some way to showing that those who are overweight, while they can indeed do something about it, aren't just 'greedy and lazy', which is how it is often put forward.

1.16. How big or small should a surplus or deficit be?

The amount over or below your maintenance calories which you should eat is not something which is easy to answer, but we will give some very solid guidelines along with our rationale for what we recommend. Firstly, it's very difficult to give a definitive answer, especially as a hard and fast number (it's often said that you should eat 500 calories below maintenance, or 500 above, on the theory that 3500kcals roughly equates to 1lbs of fat) because of the factors we just talked about. If two people eat 500 calories below their maintenance calorie level, an obese person might end up eating North of 3500 calories, lose weight very slowly and not really improve their health while a small female might end up on so little food she can't function. If we give a definite figure then some might lose weight very quickly and suffer, while the other might lose very slowly and suffer. On top of this, two identical people might eat the same deficit and while one will find it a breeze the other will find every day a struggle. As such, the guidelines are a little more vague.

1.17. Size of a surplus

To consider how much you should eat above your current maintenance intake, we need to consider how fast you should be gaining weight, which is in turn dictated by how much muscle you can reasonably stand to gain. If, of course, you are starting from a point of being severely underweight for any reason, then the guidelines would be different, but that's a job for a dietician.

Your rate of weight gain should be such that it minimises fat gain. It's a very rare circumstance where fat gain over and above the minimum amount necessary is welcome by anyone – some exceptions may exist in heavyweight strength sports, for example, but that's about it. Rather, the majority of people looking to gain muscle will be looking to do so to either improve in a sport which requires overall fitness or adherence to a weight class, both of which would be hindered to a large extent by the unnecessary addition of fat tissue, which could have been avoided, or simply to look good with their clothes off.

Because of this, it's pertinent to get a good understanding of how much muscle it is likely for an individual to gain and at what rate. Of course, there will always be genetic outliers who can gain more than this, and there will be the unfortunates who gain less, but a good estimate for muscle mass gain is (as calculated by Alan Aragon in his manual Girth Control):

1.18. Training level and potential rate of muscle gain

- **Beginner:** 1-1.5% of bodyweight per month

- **Intermediate:** 0.5-1% of bodyweight per month
- **Advanced:** 0.25-0.5% of bodyweight per month

Note: This is for males. Females can pretty much half this due to their lower muscle gaining potential.

A trainee can be considered a beginner for approximately the first 10kg of muscle mass gained, assuming he starts from his normal weight (again, females can approximately half this for a reasonable estimate, and of course this is a very vague figure given to provide some amount of context). This should take somewhere in the region of 12-18 months of good gym programming and eating on average, but of course could take more or less time. The intermediate stage lasts as long as a piece of string unfortunately, and the advanced stage is even harder to define, but the point here should be quite self-evident.

A typical 75kg male, assuming he has never touched a weight in his life, can hope to gain **at best** (assuming great genetics, eating and training) 1.2kg s of muscle per month in his first year, which is around 300g per week. After that the number drops to around 750g-1kg per month for a while before trailing off into amounts which are difficult to even measure.

A typical 60kg female can hope to maybe gain **at best** 600g or so muscle per month, or 150g per week, dropping to 150g per month or so after that.

Your rate of weight gain, therefore, should be pretty slow.

It's a good idea for males to aim for a gain of about 0.25-0.5% bodyweight gain per week (or 1-2% per month) which will more than likely translate to something along the lines of a 5-10% increase in calories, or 200-400kcals per day for most.

A female could go for around 0.15-0.3% of bodyweight gained per week (or roughly 1% per month), meaning a 150-300kcal surplus per day, for most.

As we'd hope is obvious, you may need to adjust these figures depending on how you progress because as we said, you might experience resistance. You'll note that this rate of gain is a little higher than the possible muscle gain figure but that is because you will gain some additional water within your muscle cells as an adaptation to training and you will probably gain some fat alongside that, too. A targeted weight gain period should last around 3 months at best (4 in some very rare cases) before you consider a leaning out phase to reduce bodyfat back to levels you are happy with and that are healthy. If after this time, you haven't gained all that much weight, consider eating a little more and going for a few months longer.

The rate you choose should be dictated almost exclusively by how comfortable you are with gaining a little extra bodyfat. Assuming you are going to follow the guidelines to gain weight slowly and only for given periods of time you are unlikely to adversely affect your health by gaining weight at the higher end of what we have mentioned here, but you might start to hang over your jeans a little more. The happier you are with some fat gain, the faster you should gain weight (within these guidelines) as it can potentially increase your muscle mass accruement, but please note that overeating for the sake of it and gaining 3-4kg per month

or more only results in extra fat gain which you'll have to deal with at some point in your next dieting phase. If that's something you're comfortable with, of course, be our guest – there's no moral judgement to be made here.

We know, though, that the vast majority of people are looking to reduce their weight (or at least their bodyfat) and as such we will now return to the other side of the coin – facilitating weight loss.

1.19. Size of the calorie deficit

Much like the rate of weight gain, it's hard to give a definitive guideline for fat loss because it's largely individual, as are many things with the human body. Rather than above, though, where your rate of gain is dictated by your muscle gain potential and psychological response to fat gain, your rate of weight loss will be dictated primarily by your dietary adherence.

To improve adherence to a weight loss diet, it is generally thought that one should make small, steady changes which are as close to an individuals' comfort zone as possible. A smaller deficit will result in a reduction in all of the above-mentioned methods your body uses to resist weight loss, meaning that a smaller calorie deficit results in less hunger, more energy and in the context of the modern lifestyle it allows for more 'treats'. If you are eating 2000 calories rather than 1600 you have far more room for dessert or alcohol, which makes it easier, right?

Yes and no. Dietary adherence is not improved in the same way for everyone. It's a big mistake is to assume that a slow and steady approach is what everyone will want and should do.

Faster fat loss approaches may cause greater hunger and potentially risk more muscle loss (though this will be mediated by following steps in later modules, unless you are very muscular and/or lean) but they also cause far faster visible results which can be hugely motivating. Consider it like removing an Elastoplast – you can hurt a little for a long time or a lot for a short time, and there isn't necessarily a right or wrong answer.

As a rule of thumb, one should aim to lose 0.5-1.5% of your bodyweight per week, with the lower number being an easier diet and the larger being a faster result (with more associated risks and downsides to one's health). The only caveats to that are very lean people who should opt for the lower number to reduce muscle mass loss risks (this is not really a problem unless you're quite lean and muscular to begin with, fat is much easier to access for metabolic purposes) and very obese people who can stand to lose faster without concerns. This generally translates to a 10-25% calorie deficit on average (again depending on adaptations and resistance). For our 85kg male who needed roughly 3100-3200kcal per day, this would mean he should eat between 2700-2800 and 2300-2400.

A general rule of thumb is that you should lose fat at a rate that you can maintain for the amount of time it takes to lose the amount of fat you want to lose – no faster, no slower.

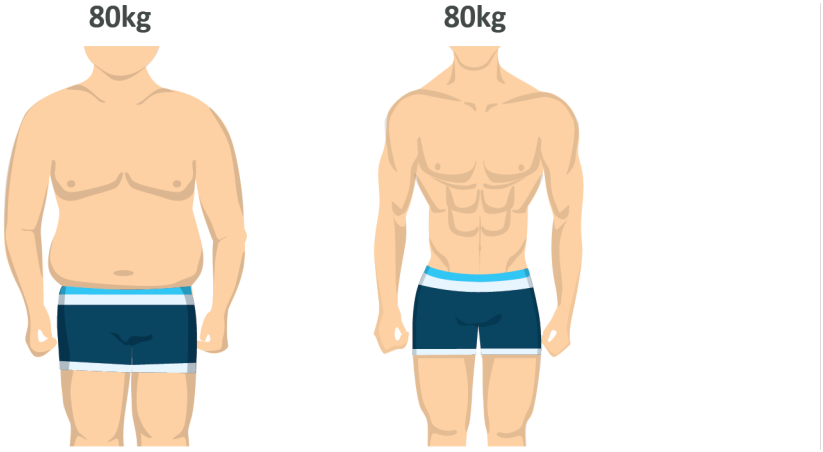
1.20. A note on recomposition

So far, we have spoken largely about weight gain and loss, though of course we are not necessarily concerned only with weight, but of body composition. In this course, we will be

using the definition of 'body composition' which is concerned with the amount of muscle you have compared to the amount of fat you have, though body composition strictly speaking is also concerned with other tissues and water etc. We will also assume that 'improved' body composition is achieved when muscle is increased and/or fat is lost.

Body recomposition is, therefore, a shift in the amount of fat and muscle you carry independent in changes of weight. In simple terms, recomposition is the process of building muscle tissue and losing fat tissue at the same time. To explain this process, we need to brush over some very basic physiology first.

Fig. 4



Recall the cellular processes which were mentioned above as being constituents of metabolism. One of these was protein turnover, which is the process of combining amino acids which are in the bloodstream with the proteins in skeletal muscle (this is going to be covered a lot more in the next module). Muscle protein synthesis is the process by which muscle is built. It is also, however, the process by which muscle is maintained.

24 hours per day, proteins are being broken down and rebuilt within your muscle tissue (which is why it's called turnover). This happens every single day, regardless of whether or not a person performs resistance training in order to keep the tissues and cells in proper working order. Rather than resistance training being the thing which allows this process to happen, it is more accurate to consider resistance training a process by which we allow for greater amounts of muscle protein synthesis to occur. To illustrate:

- On a normal day, you might break down 10 units of protein within your muscle and rebuild another 10, leaving a net of zero. If you perform resistance training you increase the amount of muscle protein synthesis which is possible over the next 72 hours or so, meaning that you have broken down 12 units of protein (more because of training) but could potentially rebuild 14 or 15, meaning a net of 2 or 3 increase

(These numbers are of course random just to illustrate a point and not relative to anything specific or proportionately accurate).

This process is an energy dependent one. Not only does dietary protein (or at least the constituent parts of it) need to be consumed so it can be stored within muscle tissue, you also

need energy over and above what would usually be required to maintain that muscle to do it. That makes logical sense, because each unit of protein stored requires a certain amount of energy to facilitate that storage.

So, in order to gain muscle, the most simple manner is to eat more calories than you require to maintain your weight, but if you read the above, at no point does it say you need more energy than you need for weight maintenance, you just need more energy than is required for muscle protein maintenance.

If you are eating around the same amount of energy that you need during the day (so at maintenance level), but performing resistance training and eating protein in a manner which is in line with what is required for building muscle, it is VERY possible that your body's fat stores can be accessed for energy which is then used in the muscle building process.

You are eating X amount of energy, but then adding Y amount of energy from your fat stores in order to facilitate muscle growth.

In short, if you are training in a progressive manner and eating at maintenance level with protein intake optimised, you can indeed maintain your weight, lose fat and build muscle at the same time.

Some considerations:

- Both muscle gain and fat loss will be slower than if you'd focused on one or the other by itself
- At some point, you will need to gain weight to gain large amounts of muscle. At some point, also, you will need to lose weight to get very lean. This may be beyond what some people in the general population, perhaps you included, care about, but if you are now 70kg and want to be 80kg and lean, you're probably going to have to overshoot that by quite a bit at some point
- This requires more consistency and precision with your nutrition and training than doing one and then the other
- The process can be somewhat frustrating, as changes are not going to be as dramatic as if you did one or the other
- The more advanced in terms of muscular development and training age you are, the harder this is to do to a level which will give meaningfully noticeable results

With those considerations made, though, there are some positive things to be said about the recomposition option. Namely, you never have to 'look fat' or suffer with a low food intake, you will always fit your clothes nicely and, for those happy to wait a longer time for results, it's comparatively less stressful as you need to more or less do the same thing all year round.

There is no right and wrong answer here, but from experience those for whom training is only a small part of their lifestyle, recomposition is a better option while for those who are seeking either faster or more dramatic results the lean gain/fat loss approach is more appropriate. As always, though, adherence is key and you need to decide the best approach for the situation.

1.21. Should everyone count calories?

NO. As we mentioned earlier, this is not a course on counting calories and we do not recommend that everyone does so, at least forever. Most people who are only starting out paying attention to their nutrition can get the greatest 'bang for their buck' by improving food choices and their macronutrient intake while looking closer at food labels and managing portion sizes as we will discuss in later modules. It is very possible to get into great shape and achieve perfect health without ever counting anything.

We advocate the idea that people should use an approach which will give them the best chance of adhering to their diet and improving their health, and if a calorie controlled diet makes that easier, then it should be used, but conversely it cannot be ignored that calorie counting is more or less unsustainable for an entire lifetime for just about everyone. At some point a different strategy is going to be necessary. We will be offering multiple strategies throughout the course, however, so sit tight.

Rather than thinking of calculating your calorie requirements and counting calories as the means by which fat loss is managed, we would urge you to think of them as tools. If you roughly know how many calories you need, then you have a tool which makes label reading and food decisions a little easier, and if you are able to eyeball the calorie content of a meal and therefore understand it's impact on your daily diet, then that's all the better.

Whether you count calories or not, calories make a difference, and understanding that affords you a far greater understanding of nutrition than you could ever have without it, even if you don't specifically use the information every day. It's an absolutely critical factor which is inescapable no matter what you do, so being cognisant of it is always a good thing.

1.22. Do you eat the same amount every day?

This, as many other aspects of this module, is a very individual thing.

First of all, the important thing to remember is that, for fat loss at least, your total calorie intake over the course of a week or month is key (muscle gain is a little different; it's probably best to just eat in a relatively linear fashion with the same or at least similar energy amounts each day). If during a 28 day period you eat meaningfully fewer calories than you burn, at the end of the 28 days you'll weigh less than you did at the start, but that doesn't say you **have** to eat the same amount every day.

Eating the same amount every day is a safe, simple and effective means of controlling your diet and a tried-and-tested formula for fat loss. Find how much you should eat, eat a bit less than that every day, enjoy success – simple… but also boring.

It doesn't need to be that way though, and when we again look at the individual factors which play in to dietary adherence we can start to create a picture of why. Progress can be slow, you're hungry pretty much every day and things can get monotonous – let's look at some alternatives.

One common method of setting up a diet in a non-linear fashion is to take one's average estimated calorie needs per day (TDEE as calculated previously, minus whatever you're

subtracting per day in order to lose fat) and multiply that by 7 to work out approximately how much food you need to eat that week. You can then distribute those calories unevenly across the days of any given week to account for days where you are especially busy and therefore don't mind eating less, or days where you are training particularly hard or often bored and tempted by snacks. By having low or high days you can achieve the same calorie deficit by cutting your energy intake a lot when it's easy to do so and then increasing it some more when it's not. This is by far and away not the only means of unevenly distributing calorie intakes though.

Some people may have one day per week which is spent travelling, or which is extremely busy – what if they speed their fat loss up by eating very little or fasting on that one day per week?

You could have a week where you eat very little followed by 3-4 weeks of eating a little more as a little 'boost'.

You could have one low day then two moderate days, one low day then one high day, then one low day then two moderate days, repeated, equalling fewer calories than if you had a more linear approach, but offering one day per week of eating quite a bit more, maybe on a social occasion.

You could have a stretch goal and a conservative goal, aiming for a 5% or 15% deficit every day depending on how hungry you feel.

These approaches may be harder to stick to for some, and may seem overly complicated for others, but there are many people who will be happy to eat as little as possible for a week if that's then followed by a day of eating quite a bit, then 3 weeks of eating in a more sensible calorie deficit. The result will be the same as a linear calorie intake, but this might be easier to stick to. After all, it comes down to the individual, their context, and their ability to adhere to a dietary approach.

For example, a person needing 2500 calories per day to maintain their weight could eat 2000 calories per day to lose weight, totalling 14000 calories per week. Or they could do:

- 2000 on Monday
- 2000 on Tuesday
- 1500 on Wednesday (In meetings all day at work)
- 2000 on Thursday
- 1000 on Friday
- 3000 on Saturday
- 2000 on Sunday

Totalling 13500, but with days of eating quite a bit more. The 1000 calorie day may be tough, or it could be easy because it's followed by a day of more. There are a lot of ways to skew someone's calorie intake, the point is to not be afraid to mix up the way you achieve a calorie deficit – it can be even and for many people this is easiest, but it doesn't **need** to be that way.

As a final note on this point, for anyone who will be losing weight for a prolonged period of time, full diet breaks are a very good idea. This is a week or two which is intentionally spent at a maintenance calorie level, and it serves a number of important psychological purposes.

Firstly, it makes the whole process easier. Much like your year at work is a lot easier to handle when you have holidays to look forward to, it's a lot more do-able to stick to a diet for 4-8 weeks followed by 1-2 weeks of eating more food and not being hungry, than it is to look at 18 or more months of constant dieting.

Secondly, this makes transitioning to the 'after diet' a lot easier because you learn how to eat at maintenance which is important. Many people will spend their life eating poorly, and then when they decide to remedy this the first thing they do is to eat in a deficit until they reach a goal. At this point the person only knows how to eat badly or eat to lose weight, and when they don't want to do the latter anymore they revert to the former and gain the weight back again. By spending pre-planned periods intentionally learning about cooking and eating to maintain your weight, when the time comes it then becomes the norm, and you're far more able to handle it. Transitional dieting will be covered as the last section of this module.

1.23. What about x diet?

Every single diet which causes weight loss does so by creating a calorie deficit. They may claim otherwise, but this is not the case.

Low carbohydrate diet proponents claim that by controlling the hormone insulin, which allows things to be stored in cells, they in turn reduce fat stores. What really happens is you eat less cake and more meat, meaning your diet is full of more filling and lower calorie foods, so you eat less.

Low-fat dieting is based on the idea that fat makes you fat. In truth, if you cut fat right back in your diet you just eat fewer calories because you opt for lower calorie options. You also can't eat cake.

Paleo dieting is based on the idea that our body is adapted to that way of eating (no cake) and therefore regulates itself when you stick to what cavemen ate. It does to a degree, and therefore this diet has some validity, but at the same time the arbitrary restrictions make it less than optimal.

We could go on and on, but the point has been made. This isn't just an idle consideration, there is a lesson here which ties back to what we discussed earlier in relation to the necessity of calorie counting. Each of these diets doesn't mention calories specifically and yet they cause a decrease in consumption, and they do it via means which are well understood, and which we hope to show you. Rather than looking at the differences to compare them, and rather than dismissing them for their flaws, it's far more productive to look at these approaches as imperfect ways which undeniably **do** result in success for some people, and then compare the similarities so perhaps we can work out why.

There are methods you can use to utilise food choice and composition as a tool for producing involuntary and almost unnoticeable reductions in calorie intake (the same can be done for

increasing intake to improve sports performance and cause weight gain). All of this will be explained later in the course, so stick around.

1.24. Is it all about calories, then?

Of course not. Calorie balance dictates fluctuations in bodyweight (shifts in water weight notwithstanding, we'll come to that later) and that is a primary method which we can use to improve health, but be careful when considering this as the only issue. As we mentioned earlier, weight and body composition are not the same thing and it is **very** possible to be at a healthy weight and yet be metabolically unhealthy – largely due to food choices, alcohol/smoking/drugs and low activity levels. From an aesthetic standpoint, it's also quite clear that you can be a healthy weight and not be happy with your appearance.

As such, improving your food quality, considering your macronutrient intake and managing your levels of stress, sleep, hydration and exercise can have a phenomenal impact on your health independent of changing your weight, although this may happen as an aside.

Waist circumference is one key means of determining your health risks independent of weight. The below tables are a reasonable indication of how healthy you are, which consider frame size and muscle mass to a more reasonable extent than BMI does. As a final note on this, there is the benefit here that those who do not wish to weigh themselves can still take objective measurements of their current situation and their progress.

Fig. 5

Health risk	Women	Men
Low risk	Below 31.5 inches	Below 37 inches
Moderate risk	31.5 to 35 inches	37 to 40 inches
High risk	35 inches or more	40.2 inches or more

With all of that said, it would be inappropriate to forget that the calorie in/out equation is undeniable, and that excess bodyweight (or at least bodyfat as indicated by waist circumference) is probably the primary factor in lifestyle related disease, or at least the second most important after activity levels. Calories do indeed impact weight and therefore health regardless of source, as is indicated by the college professor from Kansas State University who ate a diet of Twinkies, cereal and Oreos at 1800 calories per day to lose a lot of weight and improve a number of blood lipid levels which are important risk factors for heart disease. While this is very telling, though, it doesn't mean that a Twinkie Diet is a good idea long-term – for **long-term** health we also need to consider the composition of those foods, and it is to that topic that we will turn for the next few modules of this course.

1.25. Transition dieting

For our final consideration in this module, we would like to leave you on a short note about transitional dieting. Transitional dieting is, as the name would suggest, the period which you transition from a calorie deficit to maintenance after losing your desired amount of weight, and then the period which you maintain that weight.

Fat loss is not difficult. Just about everyone who is overweight will lose appreciable amounts of that weight at one point or another during their life – the problem is with fat loss maintenance. It is because of this fact that the course you are undertaking and others like it are so critical. By learning about nutrition per se, and not just weight loss, you can place yourself in a position whereby you can alter your intake to suit any goal, rather than just learning how to manage to eat less for a given amount of time.

Transitional dieting can be hard, because it requires you to consciously eat more and trust that you aren't going to end up back where you started. By learning about nutrition before/during the dieting process this is easier because you are not just leaner/lighter, you are more knowledgeable about nutrition and the application of nutritional practice and you have developed good habits.

A good way to approach this is to gradually increase the amount of food you eat week to week. Start slowly and gradually increase portion sizes while broadening the range of more calorie dense food choices which you opt for as you gain in confidence and understand your own body more and more. Combining regular diet breaks with this final approach is a very powerful tool in your arsenal. We'll talk a lot more about transitional dieting in the final module of the course, but for now just remember that food choices, exercise choices, NEAT levels and flexibility are key in diet adherence, and should all be considered when building a diet.

For long-term fat loss, you need to have control over the entire pyramid, but we've only just begun by talking about the energy value of foods and what that means for us in terms of weight management. In the next module, we will be looking at the large nutrients contained within the foods we eat that 'contain' that energy, the macronutrients.

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