

## **The role of nutrition, exercise, sleep and other essential elements in Musculoskeletal Health.**

Of all of the articles on our website, this is the longest and most important. These factors play a huge role in either directly impacting our musculoskeletal health or indirectly impacting it because they affect our overall health. The way medicine is structured, we have specialists in musculoskeletal health, specialists in cardiovascular health, specialists in respiratory health and so on. This might encourage us to view the body as being in separate “health compartments” but this is very much not the case. We function as one individual and poor health in one area can certainly impact your health in other areas. We must therefore pay attention to our overall health.

Given our busy modern lifestyles many of us are keen to seek “quick fixes” and medicine also plays its part in the “quick fix” industry. But the power of attending to the basics such as nutrition, exercise, sleep and stress control should never be underestimated both from a preventative and curative perspective. After all, nature and evolution have had millions of years more practice in perfecting this.

We are unable to do justice to the massive body of evidence that exists for each of the following factors listed here but hopefully this article will provide at least some insight into the powerful effects they exert so that you can explore further.

### **DIET AND NUTRITION**

The fundamental aim of nutrition is to give the body the nutrients it needs to function properly and for the growth, maintenance and repair of body tissues. Poor nutrition and hydration are amongst the major lifestyle risk factors for musculoskeletal health, along with sedentary lifestyles and obesity.

Sadly, our “quick fix” world has brought with it many ultra-processed, nutrient deficient “foods” with non-nutrient ingredients (e.g. artificial chemical ingredients which improve taste and shelf life of the product). We have a growing obesity crisis and many more people are in poor metabolic health with high levels of inflammation and rising insulin resistance which can eventually manifest as Type II diabetes.

So what is going wrong? Why is it that so many more humans (and often our domesticated pets) are having issues with obesity? Some wild animals may eat more during summer to store fat to survive the winter, but consistent obesity is rarely seen in the wild. Lifestyle and environment play their part, but in searching for why we have rising obesity we must look to the food industry. It

invests heavily to make its products “more-ish”, perfecting taste and texture so that we want to go back for more. As far as the food industry is concerned, an addicted customer is a high consumer ...and a repeat consumer and that is where the profit lies. By nature, we are designed to know when to stop eating (i.e. we are programmed to reach satiety and know when we “feel full”) but these signals work much better when we eat natural, minimally processed food. Food processing alters both food structure and nutritional density. It often raises the glycemic index of the food (i.e. it causes a rapid rise in blood sugar) and is less satiating. In other words, it encourages us to eat more than we need.

So what do we need to eat for good musculoskeletal health? Let's consider what the research says about the three macronutrients that we will all be familiar with: namely protein, fat and carbohydrates

## **Protein**

This is the key component of bone and muscle and it is essential for growth, renewal and maintenance of these tissues. Adequate protein helps to maintain muscle mass whilst a number of epidemiological studies demonstrate reduced bone density and increased rates of bone loss in people who habitually consume a low protein diets. Sources of protein include:

- Animal protein (meat, poultry, fish)
- Dairy and eggs (if tolerated)
- Vegan sources such as lentils, beans, nuts and seeds. Note that some of these need to be soaked prior to consumption to increase digestibility and lower phytate levels (phytates can bind to nutrients and stop them from being absorbed in the gut)

## **Fat**

For years we've been told that fat is bad for us and indeed the food industry has created a plethora of “low fat” foodstuffs, many of which have added sugar to make up for the taste lost by removing the fat. Indeed, despite the labelling and marketing ploys of the food industry some of these products marketed as “healthy options” can actually be more unhealthy than their non-low fat counterparts.

The bottom line is that our bodies need fat. Not only are our brains made up of around 60% fat, fats are essential for the absorption of certain vitamins, they are needed to make cell membranes and they are important for the manufacture of hormones.

In addition, the once touted thought that “eating fat makes us fat” requires more nuanced thinking. On the one hand, fats are high in calories so eating an excess could lead to weight gain. But on the other hand, fats are also “slow burn” fuel. They do not cause spikes in blood sugar and they keep you feeling fuller for longer which keeps hunger pangs at bay. If you don't feel so hungry then you're less likely to snack. And if you're not snacking as much then chances are you'll eat fewer calories during the day.

So having dispelled the blanket myth that fat is an enemy, we do need to know that not all fats are created equal. Some types of fat are good for you, and some are not.

## What are saturated and unsaturated fats?

These terms describe the chemical structure of the fat. All fats are made up of carbon, hydrogen and oxygen molecules. Saturated fats contain the maximum number of hydrogen atoms and contain no double chemical bonds.

We can categorise fats into two broad categories: saturated and unsaturated, and then we can break the unsaturated category down into three types: monounsaturated, polyunsaturated and trans fats.

**Saturated fats** – such as those in animal (e.g. meat and dairy) products including butter and lard.. Coconut oil is also high in saturated fat.

The topic of saturated fat divides scientists. Saturated fats were once thought to be bad because they increase the LDL cholesterol. However, LDL cholesterol comes in different particle sizes and it is the smaller particle size LDL which has been identified as the harmful one because this is the one which is implicated in the formation of plaque in the arteries, which contributes to the development of cardiovascular disease. Some studies now show that saturated fat mainly increases the large particle size LDL and large LDL particles do not appear to increase the risk of heart disease..

One of the issues is that when we look at a person's cholesterol levels and measure their LDL, we don't measure respective particle sizes, so there is no way of knowing (without more specific tests) whether a raised LDL level is due to an increase in small or large particle sized components. As research progresses, we may eventually change the way we screen a person's cholesterol, but for now the takeaway message is that saturated fats do not appear to be making quite the contribution towards heart disease that we once thought they did.

One of the benefits of saturated fat is that they are very stable. They don't become oxidised or rancid with heat, so they make an ideal choice when cooking at temperatures over 180°C.

**Unsaturated fats** - We will look at the different types (monounsaturated, polyunsaturated and trans-fats) in turn:

### **Monounsaturated fats:**

Chemically, these have one unsaturated carbon bond per molecule. Examples of foods that contain a high proportion of monounsaturated fat are olive oil, avocados and some nuts such as walnuts and almonds. These are considered healthy fats – good for heart health and for lowering the amount of inflammation in the body.

However, being unsaturated means that they are not as heat stable as saturated fats so they are generally better for low heat cooking (below 180°C), although something like avocado oil has a higher “smoke point” and is more heat stable than olive oil.

## **Polyunsaturated fats:**

Chemically, these have multiple unsaturated carbon bonds per molecule. These are also considered to be healthy fats..

Omega-3 and Omega-6 are examples of polyunsaturated fats and both are essential for health.. However, a healthy ratio of Omega-6 to Omega-3 appears to be somewhere between 1:1 and 4:1 and studies have shown that most western diets have a much higher ratio (somewhere between 15:1 and 17:1). These higher ratios may be problematic because whilst essential for health, the most common Omega-6 fatty acid is linoleic acid and this is converted in the body into pro-inflammatory eicosanoids – in other words, substances which promote inflammation in the body. For this reason, many of us would benefit from incorporating more sources of Omega-3 in our diet.

Omega-3 fatty acids are responsible for supporting many important processes in our metabolism from our immune system to our brain. They lower triglycerides, lower inflammation and protect our cardiovascular health.

- **Marine sources** are oily fish (like salmon or mackerel) and marine algae (the latter is often taken in the form of a supplement. These are good sources of the Omega-3s known as EPA and DHA
- **Plant sources**, such as flax seed, chia seed, sunflower seeds, pine nuts and walnuts provide shorter chain Omega-3 fatty acids in the form of a different type which is known as ALA. Your body can convert the ALA from plant sources into EPA or DHA, but this is a highly inefficient process. On the other hand EPA can reduce symptoms of depression and help fight inflammation in your body whilst DHA is very important for brain development and may protect against heart disease, cancer, and other health problems. For this reason, marine sources of Omega-3s are superior.

However on the negative side, higher levels of unsaturation makes polyunsaturated fats even more prone to oxidation and rancidity. They store less well and are less heat stable. You should avoid high heat cooking (e.g. frying) with polyunsaturated fats and this is also the reason why, if you want the benefits of the EPA and DHA from fish, it is better to try to obtain this from fresh oily fish than from a supplement that might have been sat on the shelf for ages.

## **Trans-fats**

Trans-fats are contained in margarine, biscuits, cakes and many fried foods. They are highly pro-inflammatory. They lower your HDL (good cholesterol), raise your LDL and are very definitely considered to be bad for your health.

## Carbohydrates

Unlike fat or protein, carbohydrates are not an essential macronutrient. However, they can provide a source of energy and some carbohydrate rich foodstuffs contain other beneficial vitamins and minerals. Our current guidelines suggest that we should get around half of our daily calories from carbohydrates. However, this is a matter of some debate.

Dietary carbohydrates come in three main categories:

- **Sugars.** These are sweet, short-chain carbohydrates (e.g. glucose, fructose and sucrose). They are quickly absorbed from the gut into the bloodstream and cause a spike in blood sugar levels. Sugars in particular may be viewed as “fast burn fuel”. The spike in blood sugar provides an energy boost that is short lived which can be very unhelpful. First, the energy burst is short-lived so we are hungry again for energy very soon. Secondly, the body releases insulin in response to sugar spikes to store this sugar as glycogen for later use. Very frequent spikes in sugar can lead to something called insulin resistance where the body becomes sluggish at mounting an insulin response, and if left to continue doing this, a person can develop Type II diabetes.

The body also stores excess sugar as fat through a process known as lipogenesis, so given its addictive quality, sugar consumption in particular is a major factor in the development of obesity.

The addictive quality of sugar is something that food manufacturers utilise in their products. If you want to eat more, you'll buy more....and the food manufacturer will make more profit. So many highly processed foods contain significant amounts of sugar or sweeteners to mimic the taste of sugar. We will discuss sweeteners shortly when we look at the gut microbiome, but ideally you should try to avoid both. Some sweeteners are artificial chemicals which have zero value as far as nutrition is concerned and these can also come with their own health downsides.

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- **Starches.** These are long chains of glucose molecules. We sometimes refer to these as “complex carbohydrates”. These too eventually get broken down into glucose in the digestive system and the glucose is absorbed into the blood stream. Refined carbohydrates (like white rice, white pasta and other products made with white flour such as bread or biscuits) are broken down into glucose more rapidly than their whole grain equivalents, so they can also cause reasonably rapid rises (spikes) in blood glucose
- **Fiber.** We cannot digest fiber, but the bacteria in our guts can make use of some types of fibre. Fibre can also slow down the absorption of glucose into the bloodstream, giving a degree of protection against the occurrence of rapid glucose spikes. For this reason, fibre is considered a positive addition to the diet.

## So are we eating too many carbs?

If you think about a typical Western diet, you can probably answer this question yourself:

**Breakfast:** Some type of processed breakfast cereal (contains carbohydrates possibly with added sugar), white toast (refined carbs) and a glass of fresh orange juice (essentially a glass of sugared water with the fruit fibre removed so that it is absorbed into the bloodstream very quickly)

**Lunch:** More bread (possibly a white bread sandwich with a small amount of filling). This is another carbohydrate rich meal.

**Dinner:** Including a generous portion of white pasta, rice or potatoes

**Snacks:** Biscuits, cakes. Quick, tasty and easy, but filled with carbs in the form of sugar (as well as trans-fats!)

This is not an atypical daily menu for the average person in Britain. It is highly carb-laden and in particular contains a lot of sugars and white (refined) carbs which are rapidly converted to sugar in the body. This type of diet will probably make you want to snack more and with each intake throughout the day, these sugars and refined carbohydrates are causing frequent spikes in blood sugar. Since the body releases insulin in response to sugar spikes and stores excess sugar as fat, is it any wonder that we have growing crises with obesity and diabetes?

## **The role of vitamins and minerals**

### **B Vitamins**

The B vitamin group is important for bone health. B6, B9 and B12 are cofactors for the enzymes that are involved in the metabolism of homocysteine, and deficiencies have been shown to coincide with elevated homocysteine levels. High levels of homocysteine can impair bone health leading to decreased bone mineral density and increased risk of fracture..High levels of homocysteine have also been linked to lower muscle strength in women.

For overall health, the B vitamins also confer other benefits. Many are responsible for converting the food we eat into energy, so tiredness and lethargy can be one of the symptoms of a deficiency. They are also important for red blood cell production, eyesight, brain function, digestion, appetite, proper nerve function, the production of hormones and healthy cholesterol and cardiovascular health

Good sources of B vitamins include wholegrains, dark leafy vegetables, meat, fish, eggs and dairy products. Those following a vegan diet will need to supplement with vitamin B12 since this is not provided by a modern plant-based diet.

### **Vitamin C**

As far as musculoskeletal health goes, vitamin C helps in the formation of collagen which provides structure for minerals in the bone. It also plays a role in stimulating bone formation and has positive effects on calcium absorption. Looking more broadly at health, vitamin C promotes immune function, neurotransmitter production, cardiovascular health and wound healing

Fruit and vegetables can provide good sources of vitamin C. For example, yellow bell peppers, kale, broccoli, brussels sprouts, kiwi and citrus fruits all contain good sources of vitamin C. This vitamin can also be found in animal products (particularly organ meats like liver, and eggs), but to a lower extent.

### **Vitamins D & K**

Vitamin D is a fat-soluble substance which has very important effects on musculoskeletal health. It is fundamental to bone health as it regulates calcium and phosphorus and is required for their

absorption from food. It is also needed for new bone formation. Vitamin D is positively associated with immune function and deficiencies have been implicated in autoimmune diseases such as Rheumatoid Arthritis and other inflammatory conditions.

Vitamin D deficiency can lead to a range of musculoskeletal problems including muscle weakness, bone pain, increased risk of falling and low bone mass and has been linked to many other conditions such as osteoporosis and rickets. Meta-analyses have clearly shown a significant reduced risk of fractures in subjects supplementing with calcium with vitamin D.

In 2019, The British Nutrition Foundation warned that low levels of vitamin D in the UK were extremely concerning and that younger people were at risk from developing osteoporosis and osteomalacia. Given that exposure to the sun is one of the main ways that we obtain vitamin D, the fact that many of us (including children) are spending more of our time cooped up inside is unlikely to be good for our health.

Whilst we also obtain vitamin D from food sources, in the winter months this may be insufficient, because there is less sun and we have less skin exposure to it (because we are more inclined to wrap up to stay warm or we stay inside). In 2016, Public Health England advised that everyone should be supplementing with vitamin D (and specifically in the form of D3 as it is more bioavailable).

Food sources of vitamin D include fatty fish, eggs yolk and butter. Mushrooms also contain vitamin D and you can even dramatically boost the content of vitamin D in your store bought mushrooms by placing them, gills up on a plate and exposing them to the sun for an hour or so before you use them.

Vitamin K has been shown to work synergistically with vitamin D (i.e. these work together) and has positive effects on bone mineral density, calcium balance and bone metabolism. Good sources of vitamin K are found in green leafy vegetables such as kale/ collard greens and spinach

## **Vitamins A and E**

These fat soluble vitamins are also essential to health, playing roles in things like immunity, vision, skin health. Carrots, sweet potatoes, kale and spinach are good sources of Vitamin A, as are many fatty fish. Seeds, nuts, oils like olive oil, kiwi fruit, avocados and (again) fatty fish are all good sources of Vitamin E.

## **Calcium**

This is an integral component of bone and is the most abundant mineral in our body – 99% of total body calcium is found in the bone. The formation and maintenance of bone (through opposing mechanisms of bone resorption and bone formation) are processes that spans our lifetime. However, blood concentrations of calcium must be kept within a specific range to maintain essential functions in the body, such as muscle contraction. If the diet is too low in calcium the body responds by releasing the parathyroid hormone which instructs the bones to release calcium. Over time, this can weaken bones and leave them prone to disease. Diseases such as osteoporosis occur when bone resorption exceeds bone formation. On the other hand, too much calcium can also cause issues.

Calcium cannot be made by the body so must be delivered via food or supplementation. Most of us can get sufficient calcium from our diets. but our ability to absorb calcium reduces as we get older leaving us more prone to disease.

In addition to dairy products, other calcium-rich foods include dark leafy vegetables, fortified foods and soft-bone fish such as sardines and salmon.

## **Phosphorus**

Phosphorus also provides a structural role in bone, but in the same way as calcium, we want neither too much nor too little of it. Fizzy drinks often contain phosphoric acid and there is some research that over consumption of fizzy drinks may interfere with calcium absorption and increase the loss of calcium from the bone.

## **Magnesium**

As with the minerals we've already discussed, the majority of the magnesium in our body is located within our bones and it plays a key role in the formation of new bone and for maintaining bone density (important when we think about osteoporosis). Magnesium also plays an important role in helping muscles to relax. It aids the absorption of calcium, which helps to stop the calcification of soft tissue and muscle. A deficiency of magnesium can lead to inflammation, increased joint and muscle pain and can increase the risk of some chronic diseases.

Many dietary factors can deplete magnesium such as the over-consumption of fizzy drinks, alcohol, caffeine and sugar. Avoidance or reduction in these with an increased consumption of dark leafy vegetables, nuts, seeds and wholegrains should ensure the body receives sufficient magnesium. It is important to be mindful of the increased need for magnesium as we age, due to factors such as decreased absorption, illness and/or medications

## **Zinc**

Zinc is needed for bone tissue renewal and mineralisation and plays a vital part in the regulation of bone homeostasis. Zinc is also important for the immune system. Research has shown a reduction in zinc concentrations in people who have autoimmune disease (including Rheumatoid arthritis) .

Diets that are low in protein may be at risk for zinc deficiency. Foods that provide good levels of zinc include red meat and poultry, wholegrains, pumpkin seeds and legumes.

## **Inflammation and the role of food**

Some musculoskeletal conditions can have an inflammatory component. Let's consider osteoarthritis, a degenerative joint disease which becomes more common with age due to wear and tear and loss of cartilage. Although it is not typically classed an inflammatory condition, there is much research now that shows inflammatory mediators are involved in its initiation and progression. Whilst the benefits of an anti-inflammatory diet are often touted for heart health, this can also be beneficial for the musculoskeletal system.

Anti-inflammatory foods include lots of vegetables and some fruit, healthy fats such as fatty fish, olive oil and avocado and other components such as ginger and turmeric. Avoidance of processed foods is recommended as these can be high in sugars and unhealthy fats, which are pro-inflammatory. Grains containing gluten are sometimes problematic and removal of these from the diet is suggested as is the removal of dairy if they do cause problems. There are many alternative sources of calcium available if dairy is an issue.



## Obesity

Obesity is predominantly linked to diet. Of course exercise and other lifestyle factors can play a part but for most of us, diet is the primary factor. Obesity is closely related to the development of osteoarthritis (extra weight puts extra pressure on the joints and bones) and it also creates low-grade inflammation in the body.

Public Health England has highlighted tackling obesity as fundamental in addressing musculoskeletal health in their 5-year health programme.

We have already said that highly processed foods in particular, can be addictive and can blunt the satiety signals which would normally tell us when we've eaten enough. And, we have looked at the role that carbohydrates (and particularly sugar and white, refined carbs play in increasing fat storage in the body.

## The Gut Microbiome

Did you know that you have more microbial cells in your body than human cells? Most of these reside out gut (mainly the colon). The number and type of microbes we have in our gut differs from person to person, but it is essential for our survival and a rich and diverse microbiome is increasingly being recognised as important for health and resilience to disease.

There are plenty of good resources on the internet or books like "The Clever Guts Diet" by the late Dr Michael Moseley which provide fascinating insight into the microbiome, but some interesting information is listed below:

- You can nurture a diverse and healthy microbiome by eating a diverse range of food, and specifically minimally processed food. Some researchers have suggested that aiming to include around 30 different plant foods in your diet per week (It is about diversity, not the quantity of these and this can include herbs and spices) can help to create a diverse microbiome.
- Microbes appear to send chemical signals to your brain to encourage you to eat what they want to consume. If you are addicted to sweet stuff, it may be that your eating habits have encouraged the proliferation of "sweet loving" microbes and the messages that these microorganisms send to the brain fuel an "addiction". Sugar is bad for us, but actually so are artificial sweeteners (many of these are harmful to the microbiome), so if you want to break into the cycle of eating a lot of sugary foods, this will require a few weeks of willpower to abstain so that you can change the microbiome and eventually reduce the cravings.
- Avoid snacking. This is because eating also causes a degree of inflammation and your gut benefits from taking a rest. There is also a microbe genus called Akkermansia (a good bacteria) which helps to maintain tight junctions between the cells that line your gut. They can help guard against and repair a "leaky gut" (A leaky gut is where the gut lining becomes inflamed and these junctions open up. This allows toxins and harmful bacteria from the gut to enter the bloodstream). In fact, studies have shown that periods of fasting where the gut is rested increase levels of Akkermansia.
- You will probably be aware of commercial brands of probiotics and prebiotics. Probiotics are live micro-organisms (bacteria and yeasts) that are beneficial to consume. Prebiotics are types of fibre that feed and encourage growth of the health promoting microbes that reside in your gut. The trouble with commercial probiotic capsules is that they can be expensive, have a limited shelf life (I.e many not contain many live micro-organisms by the time you

take them), may contain very few strains of beneficial microbes and some of these may not survive passage through the stomach acid. Incorporating naturally fermented foods (yoghurt, kefir, kombucha, kimchi, sauerkraut etc) may be a far more effective way to consume probiotics. And incorporating fibrous foods in your diet can fulfil the role of a prebiotic.

- Exercise and get outdoors because this too can positively alter your microbiome.
- Specifically from a musculoskeletal point of view, an unhealthy gut microbiome and Inflammation of gut is linked with the decreased absorption of nutrients. This can affect the absorption of Magnesium, Calcium and Vitamins D and K. Inflammation can interfere with the fine balance between bone resorption and formation and there is also strong correlation between gut microbiome dysregulation and reduced bone density in patients with osteoporosis.

## **Hydration**

Adequate hydration must go hand-in-hand with proper nutrition. We are made up of around 60% water. Water helps to lubricate joints, deliver nutrients to cells and remove waste, and it helps with the normal functioning of the digestive system.

## **Summary on Nutrition - What should we be eating?**

Food choices are influenced by a wide variety of factors including our culture, value and beliefs. Some people are vegetarian or vegan. Others may prefer a carnivore diet., and then there are those whose diet is somewhere in between.

This article is not about telling anyone what to eat. Its purpose is to provide the information to make healthy choices. On a broad level we would recommend eating whole foods with a sufficient diverse range to ensure that you are getting all the nutrients you need. Avoid highly processed food. Look at your carbohydrate intake (many people have a diet which is too high in carbohydrates and sugars) and reduce this if necessary, and don't avoid eating healthy fats. And for those who are interested in a deeper dive into this topic, we think the research on the gut microbiome is very interesting.

## EXERCISE and MOVEMENT

Our musculoskeletal system is designed to move. When we don't exercise, our muscles atrophy (become smaller and weaker) and our joints stiffen up. Movement and exercise are essential to maintain strength, flexibility and good overall musculoskeletal health.

Studies have shown that exercise:

- Is beneficial to musculoskeletal health in the following ways. It increases the size and strength of your muscles and increases the strength of your ligaments and tendons. It increases the number and density of the capillaries that supply blood to your skeletal muscles
- Is beneficial for your wider health in that it can for example, help in the prevention and management of cardiovascular diseases, cancer and diabetes and reduces symptoms of depression and anxiety. It also enhances brain health, and can improve sleep and overall well-being
- Produces an analgesic effect through the release of chemicals called endorphins
- Exerts an anti-inflammatory effect (with as little as 20 minutes of moderate exercise)
- Can help to reduce chronic musculoskeletal pain in conditions such as chronic low back pain, neck pain, osteoarthritis, fibromyalgia, and rheumatoid arthritis (Some patients who have chronic medical conditions may benefit from talking with an appropriately qualified professional to help guide them on what forms of exercise might be best and how to progress an exercise routine).

So what are the best forms of exercise? There are no general hard and fast rules here, but we would recommend that this be:

- (i) First and foremost...forms of exercise that you enjoy! There is little point trying to build lifestyle habits doing something you hate. This simply sets you up for failure. So if you hate running, why not try walking or dancing or even try swimming instead? If you struggle with self motivation, you could consider whether you might like to join an exercise class.
- (ii) A pattern of exercise where you are using a wide range of muscle groups on a regular basis . Consider exercises which improve strength, flexibility, and balance, and for cardiovascular health, incorporate aerobic exercise.

If you are not used to regular exercise, or are taking up a particular exercise for the first time, you will need to build this up gradually to avoid the potential for injury. The same applies if you are looking to increase the duration or intensity of an exercise you already do. Our musculoskeletal system takes time to strengthen and adapt, and injuries can occur if you try to do too much too soon. Many people follow something like the 10% rule (e.g. runners looking to increase their mileage often do so by adding no more than 10% extra mileage each week to try to avoid injury)

For anyone who is particularly interested in exercise in relation to the longevity of their musculoskeletal health, further exploration of the work of someone such as Dr Peter Attia may be helpful. In his book "Outlive (The science and art of longevity)", Peter explains how a decline in muscle strength is inevitable as we age but our starting point at different ages will influence the level to which we decline. He suggests that one question we may wish to ask ourselves is "What would you like to be able to do when you are in your 80's or 90's?". If you would still like to be able to walk independently for a mile or so, or climb a flight of stairs unaided, then you will need to be able to do MUCH more than this when you are in your 60's and 70's.

## SLEEP

Multiple studies have shown that:

- Sleep deprivation can have adverse effects on clinical outcomes in patients with musculoskeletal pain, since it worsens pain levels, psychological health, and physical function.
- Besides being detrimental to musculoskeletal health, sleep disturbance is related to several systemic diseases (e.g. Type 2 diabetes, coronary heart disease and stroke, and ultimately an increase in early mortality)
- Improving sleep can lead to better treatment outcomes in chronic pain patients
- There is likely to be an optimum sleep duration for musculoskeletal health, with too little sleep (5 hours or less) or too much sleep (9 hours or more) both being associated with increased self-reporting of musculoskeletal pain.
- The first few hours of sleep are the deepest and it is during this phase in particular that the body performs tissue growth and repair, allowing for healing and restoration to occur.

So good quality and adequate duration of sleep is essential for good health. If you are having issues in this area, it makes good sense to try to explore and remedy these using natural methods to restore healthy sleep. A healthy sleep cycle involves four stages (one rapid eye movement (REM) stage and three non-rapid eye movement (nREM) stages). Again, sleeping tablets might seem like a quick fix, but they may not induce a normal sleep cycle and also come with side effects which can be an issue if used long term.

For more information on this topic you may wish to look up further articles on 'sleep hygiene'. This refers to healthy habits, behaviours and environmental factors that can be adjusted to help you have a good night's sleep. However, these are some pointers you may want to think about:

- (i) Are you worried or concerned about something which is preventing you from sleeping? Would it help to discuss these issues with somebody?
- (ii) Do you have a sleep routine? I.e. do you go to bed and aim to get up at a set time each day or do you go to bed at more erratic times? An established sleep routine can be easier for your body to cope with.
- (iii) Is your sleep environment the best it can be? Is it a relaxing environment? Is your mattress comfortable but supportive? Is it dark and quiet? Not too hot or too cold?
- (iv) We know that blue light can have a stimulatory effect and can keep you awake. Blue light is emitted by screens such as phones or laptops so switching off screens at least an hour before you go to bed can promote sleep. Some studies have shown that switching off even earlier (90 minutes to 2 hours before bed) is even more effective. LED lighting used in the home also produces a certain amount of blue light and some people find that glasses which block some of this blue light can also help if problems persist.
- (v) Thinking about reducing fluid intake around 1-2 hours before bed can help if sleep is being disturbed by trips to the bathroom at night. Some people are also very sensitive

to the effects of caffeine and it can help to set a cut-off point after which you avoid caffeine containing drinks in the hours before bed.

## **MENTAL HEALTH and STRESS REDUCTION**

As we said at the outset, health doesn't exist in isolated compartments. One condition can have a knock on effect on another and this isn't just the case between physical health conditions, it is also true when looking at the interplay between mental health and physical health.

Mental health conditions such as anxiety and depression can affect our physical health, as can emotional trauma such as relationship breakdown and bereavement. The most commonly experienced mental health symptom that affects musculoskeletal health is stress. We are of course designed to cope with a certain amount of stress, but it is when we become overwhelmed with stress over a longer term that our coping mechanisms can falter. Stress is associated with an increase in adrenaline, noradrenaline and cortisol hormones which can cause negative effects on the cardiovascular system, digestion, sleep and muscle function.

Mental health issues can sometimes also create a barrier to resolution of physical problems such as musculoskeletal conditions and pain. They may affect our appetite and/or sleep and can also reduce our drive and motivation to look after and improve our physical wellbeing.

Whilst treating mental health issues is beyond our expertise, from a practical viewpoint it makes sense to try to identify and where possible, reduce or eliminate any factors which are adversely impacting on your mental health. Try healthy ways to reduce stress and use whatever works for you (e.g. some people obtain stress relief by going for a run, taking a walk outdoors, doing yoga, tai chi or some other form of exercise. Some people get benefit from activities which involve relaxation (e.g. listening to music, breathing techniques) or meditation. Seek professional help (e.g. counselling) where necessary.

## **SUMMARY**

Musculoskeletal conditions can affect all age groups and are not confined to old age nor should they all be an inevitable part of ageing. There is much we can do to help protect our musculoskeletal health. Optimising nutrition, exercise, sleep and our mental wellbeing can go a long way to safeguarding against many diseases including those involving the musculoskeletal system. Making improvements in these lifestyle factors can also help to change disease progression and can lessen the impact of symptoms.

**This article is not intended to provide individualised medical advice. If you already have underlying chronic health issues we would advise that you take personalised advice and guidance from a relevant healthcare professional about how to proceed before you make drastic changes to your lifestyle (for example if you are diabetic and are looking to significantly change your diet).**