Healthy Living

REDUCE YOUR RISK OF CANCER

PCaSO

Prostate Cancer Support Organisation

Revised 2nd Edition

INTRODUCTION

A healthy lifestyle may help reduce your risk of developing serious health conditions, such as cancer, or other diseases like heart disease, stroke or type 2 diabetes. Cancer and these chronic diseases share many similar recommendations for risk reduction through healthy living aspects.

Some cancer treatments themselves may also increase the risk of cardiovascular (heart and circulation) problems.

Risk of poor health increases with age - particularly from the age of 40 and for each decade thereafter, we become at greater risk of health issues accumulating, often influenced by 'un-healthy' lifestyle aspects. We, men and women, may all benefit in some way from a healthier lifestyle; it can never be too late to start, but the earlier the better.

Cancer - risk of cancer increases with age, around 75% of all cancers have usually occurred in people aged over 60, however there has more recently been a disturbing increase in cancer diagnoses in younger persons.

A basic understanding of how cancer develops is applicable to many cancers, not just prostate cancer. Also general health and fitness can be important in dealing with cancer, so one is 'fit for the fight' of treatment and recovery.

Prostate cancer - age, race and family history are factors influencing prostate cancer risk. Also many men go through medical treatment for prostate cancer without having been sufficiently aware of how much their previous lifestyle choices may have also influenced their risk. Some men are not even aware of where their prostate is, or what it does!

About this booklet - this booklet is suitable for any adult to read, or dip into, including men choosing to take precautionary PSA blood tests. A digital version is on our website, which can be useful for clicking on links.

There are three main sections: 1.Health and Lifestyle, 2.Physical Activity and Exercise, 3.Healthy Eating, each section ends with a brief summary page of 'Key Points'.

The main sections are followed by 'Footnotes' and by 'Resources', listing sources of quotes in the text, plus information on books and online sources for any further reading. There is also a Glossary of Terms and Abbreviations.

In each section, as well as content for people in general, there are also parts that may help those men diagnosed with prostate cancer, i.e.:

- men on 'Active Surveillance', or on 'Watchful Waiting'
- men awaiting treatment, e.g. surgery, radiotherapy or hormone therapy
- patients under treatment*, to try and slow the progression of their cancer
- 'survivors ' in remission after successful treatment, to reduce the risk of recurrence of their cancer in the future

The preparation of this booklet by PCaSO has involved members contributing their experiences and information learnt about healthy living, to help both fellow prostate cancer patients/survivors and any - undiagnosed - man over the age of 40 and his family members. We hope it will encourage you to think about any beneficial changes you could make to your lifestyle, and even to do your own research.

This booklet has not been prepared by experts, nor is it a prescription. Some parts of the content have been reviewed by external parties with medical or dietary expertise, who have given their support to PCaSO. This booklet is a companion to PCaSO's long established 'Prostate Cancer, Knowledge Empowers, Information booklet', which can be particularly useful for those men facing diagnosis or treatment (See back cover of this booklet).

Note: A healthy lifestyle is not a substitute for medical check-ups or treatments, but something we can do that may improve our chances of preventing, or combatting, ill-health and cancer. *Ensure you keep your medical professionals aware of any lifestyle changes you are making.

- **This Healthy Living publication from PCaSO, a companion booklet to our Knowledge Empowers prostate cancer information booklet, explains how a healthy lifestyle can be so important for our general health and may also reduce our risk of cancer.**
- **There are three main sections: 1.Health and Lifestyle, 2.Physical Activity and Exercise, 3.Healthy Eating. Each section ends with a summary page listing 'Key Points'. When reading the digital Interactive version on the website you will find that the Contents pages provide links directly to Chapters in the booklet, for quicker access to content, return to the Contents pages by clicking onto the small coloured square at the top of the page.**
- **This digital version of the booklet contains a few extra pages that were not included in the printed version due to space limitations. For those persons who wish to delve deeper they include Technical Aspects of Cancer, a timeline of 'how Cancer occurs and develops', and the 'Hallmarks of Cancer as Influenced by Lifestyle Factors'. Also in this digital version are appendices of several tables of data, expanding on content earlier in the booklet.**

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SECTION 1

Health and Lifestyle

There are no guarantees, but whether you are a younger person who is currently fit and well, or a middle-aged or elderly person who may have some health issues, adopting a healthy lifestyle may well bring benefits, now and for your future health.

Cornerstones to good health are to eat healthily and maintain a healthy weight, together with sufficient physical activity/exercise. These are mentioned in Section 1 then explained more fully in Sections 2 and 3.

There is much more to it, however, for both the mind and body, so as to reduce the risk of cancer. In this Section 1 we firstly describe aspects that are unhealthy, such as stress, smoking, highly processed food and sugary drinks. Then we describe aspects that may contribute to good health.

Side effects from medical treatments for cancer can affect quality of life aspects, but some such as hormonal therapies can also increase the risk of other conditions. Also as we age, our risk of heart conditions, stroke, type 2 diabetes or cancer can progressively increase.

CHAPTER 1

Cancer Risk and Lifestyle Choices

Reduce your risk of (Prostate) Cancer

Cancer does not just strike suddenly, it may become apparent suddenly, but it develops from a few of our own cells that have become pre-cancerous over years, or even decades, and hence cancer is a chronic rather than an acute disease. It can be 'hidden' until it reaches a mature stage, then picked up because of screening tests, or urinary symptoms, or tumorous lumps, or even discovered when in hospital for something else altogether. Cancer, alternatively, may stay at an immature stage, controlled by the immune system and never develop into a problem that requires medical treatment.

An overview of cancer risk

Cancer is a 'disease' of *our* cells. Every day our fantastic immune system, which includes T-cells and B-cells (*see Chapter 3*) is finding and dealing with pre-cancerous cells in our bodies, so they do not develop into cancer cells, but sometimes a few cancer cells may slip through as they learn to hide from the immune system.

Only about 5-10% of cancers are from inherited genetic factors. In the specific case of prostate cancer having a close relative such as a father, brother or uncle, who has or had prostate cancer, particularly below the age of 60, carries a substantially increased risk for the individual man. Men of African-Caribbean origin also have an increased risk of prostate cancer compared to white Caucasian men.

Studies of identical twins show that there is a greater risk of contracting cancer from how they each lead their individual lives, rather than from their shared DNA. For most people without heredity or other genetic factors, lifestyle aspects can be the largest risk factor allowing cancer to develop and flourish.

Comparison of population studies shows cancer incidence is not the same around the world. Different continents and countries can have marked differences of incidence for specific cancers. Generally, a modern so-called 'Western diet', high in meat, dairy and highly-processed foods, high in sugar, fat and salt, but low in plant foods, is believed to carry a higher cancer risk than a healthier 'Mediterranean-style diet' or some Asian diets.

The risk of cancer increases with age and around 75% of all cancers occur in people aged over 60.

PROBLEMS OF AN UNHEALTHY LIFESTYLE

We may be able to deny cancer an environment that helps it grow, by swapping any 'bad habits' for good ones, **'bad habits' may include:**

Smoking – it is well known that smoking increases the risk of lung cancer, but it also affects the general health of the body. Even small levels of 'social smoking' could be dangerous, there are no safe levels. Passive ('second-hand') smoke can also be detrimental.

In an article in the Daily Mail, 9 July 2024, Nicholas Hopkinson, a professor of respiratory medicine and medical director of the charity Asthma + Lung UK said:

'It is never too late to stop smoking … Carbon monoxide, which reduces the blood's ability to carry oxygen, is gone from your system in about 24 hours. The risk of having a stroke or heart attack will fall within a few days. People with lung cancer who quit at the time of their diagnosis survive twice as long afterwards as those who continue to smoke.'

Smoking and prostate cancer - research on the Prostate Cancer Foundation website ***https://www.pcf.org/lower-risk/*** titled 'Lower your risk of dying from prostate cancer' indicates that if men smoke cigarettes, and they develop prostate cancer, they are more likely to have aggressive disease and to die from it. Those who continued to smoke after their treatment are 2 times more likely to have their cancer come back compared to patients that do not smoke.

Alcohol – even at moderate levels alcohol may be linked to cancer and weight gain.

Alcohol is high in sugar, which causes inflammation (cancer is an inflammatory disease), it also increases oxidative stress and can damage and inflame healthy gut bacteria.

Mental stress / fatigue – anxiety and busy modern lifestyles can be detrimental to health.
The hormone cortisol, produced by stress, can stop cancer cells dying, so permitting them to grow uncontrollably. Also a sense of 'hopelessness' can be pervasive on receipt of a cancer diagnosis.

A sedentary lifestyle – we are not built to be inactive, such as too much time sitting down, (e.g. 'screen time'), or insufficient physical activity and/or exercise. It can also lead to weight gain.

Poor diet and nutrition – such as eating fried, fatty, or 'fast food', or highly processed packaged foods. Too much red meat or processed meat, lack of dietary fibre and too few plant-based foods. Taking vitamin and mineral supplements to make up for poor diet and nutrition is **not** the solution.

Our ancestors hunted meat and fish and gathered plant foods (fruits, vegetables, nuts, grains and seeds) for millions of years and only in recent times has food been processed in factories. Some processed food products can be lacking in nutrition and if eaten frequently lead to fatness and obesity. Food marketing claims to health

on packaging may be misleading, making it hard to make genuinely healthy choices without studying the full ingredients list.

Added sugar – consuming sugary drinks or high sugar content foods is a 'bad habit', as sugar does not help nutrition so can be considered 'empty calories'. *Consuming a lot of sugar (even just two or more sugary soft drinks a week) increases the risk of cancer.* **[1]**

Charred food – such as burnt barbecue meats, burnt toast or food processed at high temperatures. Excess heat produces acrylamides in food, which may encourage cancer growth. **[2]**

Poor gut health (gut microbiome) – insufficient good bacteria, too many bad bacteria, can lead to poor immunity and also affect 'mood', as the gut and the brain are linked via the vagus nerve. (see Chapter 3)

Being overweight or obese – a BMI (Body Mass Index) of 25-29 is overweight, whereas 30 and over is obese. See BMI calculator at *https://www.nhs.uk/health-assessment-tools/calculate-your-body-mass-index/* the chart below indicates the healthy weight range.

Obesity is a major factor in poor health and cancer. *"Obese men are more likely to develop more aggressive prostate cancer and to have more advanced disease at the time of diagnosis"* **[3]**

Also for men with a waist size 94 cm (37") or over (regardless of BMI), measured midway between bottom of ribs and top of hips, indicates 'toxic' body fat. Your waist to hip ratio is also a good indicator of health; men with a ratio greater than 0.9 may face a higher risk of heart disease and stroke.

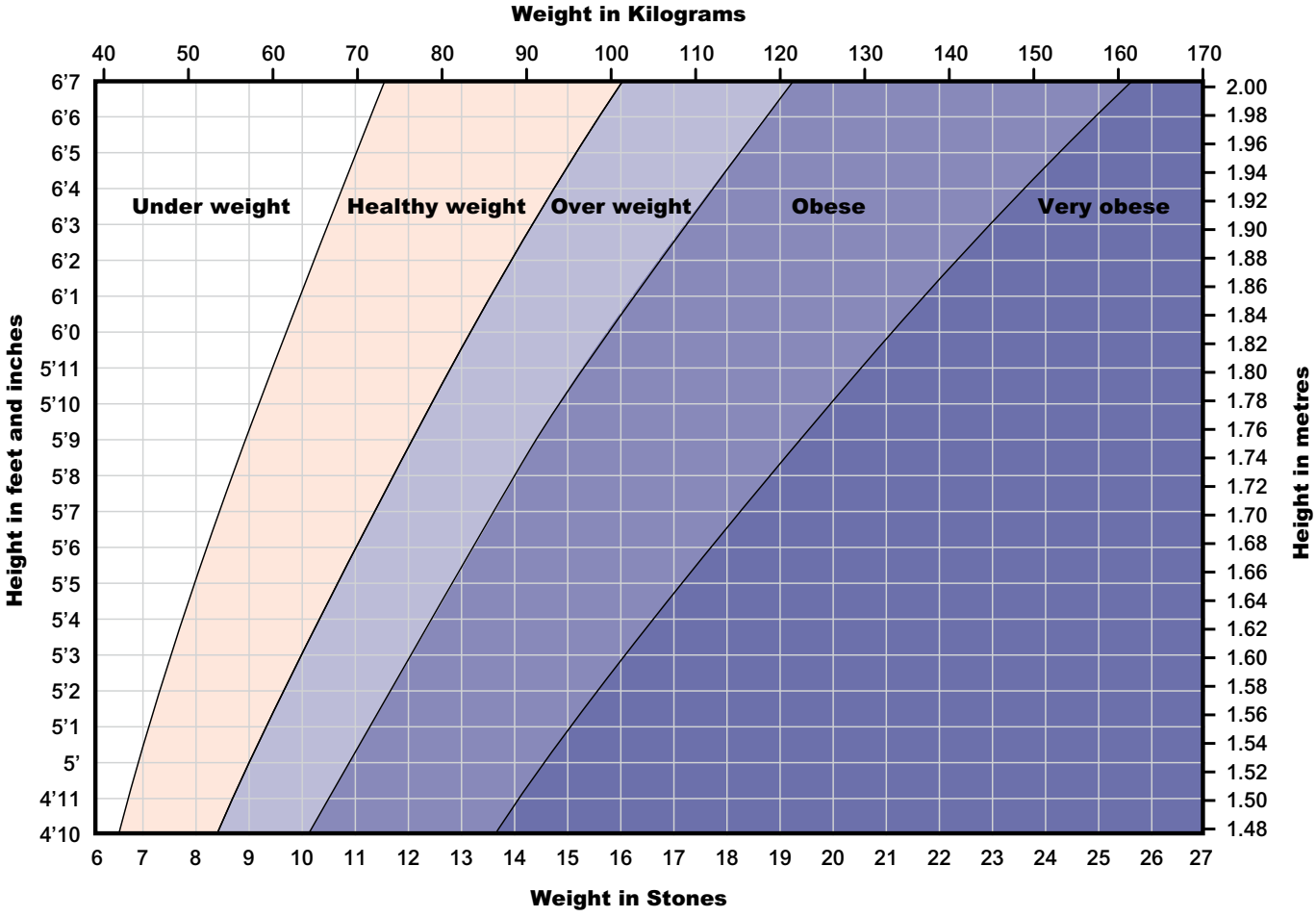
Poor oral health – plaque, gum disease, tooth decay, or bad bacteria in the mouth, can spread through the bloodstream and cause heart and stroke problems, other diseases and possibly impact the gut microbiome as well. **[4]**

Poor or insufficient sleep – can seriously impact general health and weaken our resistance to disease.

Lack of a support network – men often need encouragement to look after their health and get their check-ups, etc. Without the support of family and friends, some men may neglect their health or suffer social isolation. Loneliness and social isolation can lead to stress, poor health outcomes and premature death.

A HEALTHY LIFESTYLE

Healthy lifestyle habits are good for our general health and may slow the progression of 'pre-cancerous' cells by inhibiting mutations and preventing them reaching the mature stage. A healthy lifestyle may also slow the progression of cancer cells and tumours and may reduce the likelihood of recurrence after treatment.



Quit smoking
if you do smoke, seek help to stop, as it is not easy because nicotine is so addictive. According to the Prostate Cancer Foundation Patient Guide quitting smoking may reduce the risk of prostate cancer progression and is also associated with improved penile blood flow and erections.

Minimise alcohol –
if you do choose to drink, just have 1 or 2 small (125 ml) glasses of red wine, with a meal and also drink some water. For more details regarding alcohol consumption and its effects see Section 3 of this booklet.

Mental wellbeing –
ensure you are mentally in a good place before you embark on extensive lifestyle changes. See Chapter 5 'Mental Wellbeing'. Make time to relax, e.g., socialising with friends, or being outdoors with some activity or pastime ('the green gym'). Indoor houseplants and pets can also help relaxation.

Achieve and maintain a normal weight –
keep your BMI below 25 and above 18.5 (aim for a BMI of 21 to 23). A nutritious diet and regular exercise can help in maintaining a healthy weight.

Keep a trim waistline –
as explained on page 5 your waist measurement (men) should be less than 94cm (37") and a waist to hip ratio of 0.9 or less is desirable.

Try fasting –
our ancestors never had a constant supply of available food to the degree most of us have, and often suffered hunger, so our bodies are built to benefit from fasting. Try to find a fasting method that works for you, such as intermittent fasting overnight of 14 hours by having a late breakfast or brunch, and an early dinner, (which can alternatively be described as 'consuming all your daily calories in a 10-hour window'). There are many others, such as the 5:2 diet, or the FMD fasting-mimicking diet, a 5-day diet high in unsaturated fats and low in overall calories, protein, and carbohydrates, see article 20 Feb 2024 from University of Southern California at *https://gero.usc.edu/2024/02/20/fasting-mimicking-diet-biological-age/*

Do sufficient physical activity and exercise –
regular exercise is an essential part of a healthy lifestyle. Aerobic exercise, such as walking, running or cycling, also strength and flexibility exercises. Beware, however the danger of undertaking vigorous exercise you are not used to, so build-up gradually. **[5]**

Eat healthy whole foods –
follow a Mediterranean-style diet with lots of plant-based foods and healthy fats such as oily fish, avocado, extra virgin olive oil, nuts and seeds. Limit sugar and salt and be aware that processed foods often contain additives, sugar and salt for flavour. Try and limit use of packaged foods to those minimally or moderately processed, with just a few (healthy) ingredients, also adding extra fresh vegetables to a 'ready meal' as appropriate.

Nourish your gut health (gut microbiome) with fibre-rich foods, with natural bio-yoghurt, other fermented foods and a wide variety of colourful vegetables.

With nutritious healthy eating from a good varied diet, except for Vitamin D in winter months there should be little need for most supplements, unless you have a known deficiency. **[6]**

For more details about 'Healthy Eating' see Section 3 of this booklet.

Counter chronic inflammation –
by not smoking, by exercising and by eating fibre-rich foods such as vegetables, fruits, wholegrains and beans. Healthy fats (including those containing omega-3 fatty acids) can also reduce inflammation. Fermented foods such as bio-yoghurt can also reduce chronic inflammation. See more about 'Chronic Inflammation ' in Chapter 3.

Build a support network –
once cancer has been diagnosed the patient needs ongoing moral and practical support from family, friends and possibly neighbours or members of the local community. See Chapter 5 'Mental Wellbeing' for more information.

Maintain a positive attitude –
we can all have 'bad days', so try to maintain a generally positive attitude, whether to adversity, age and/or health problems. A 'young at heart' positive attitude can help immunity, as was reported in New Scientist, 20 March 2021 - 'Don't act your age! People who feel younger than their years tend to live longer',

Take a broad approach –
take more than one step towards a healthy lifestyle, as many different things you do may work together, to improve your chances of better health and anti-cancer effects, e.g. exercise, stress reduction and healthy eating. For example if you are mentally stressed, that may negate a healthy diet, whereas you might be very fit through exercise or sport but still at risk if you eat 'junk food'. The greater the amount of broad lifestyle changes towards healthy living the better the benefits could be, due to the synergy of a comprehensive approach and its likely influence on reducing the risk of cancer. **[7]**.

Achieving everything healthy, all the time, is unrealistic, we all have an occasional lapse, or need a break or a treat. If we get 80% - 90% right we are doing well. It all takes time to make lifestyle changes, depending on

where you start from. Once made, ensure they become embedded, so you do not go backwards and give cancer and poor health a chance again.

CHAPTER 2

Ageing, Cancer, 'Healthspan', Brain Health and Bone Health

Ageing

There are many ways in which our bodies age, which can contribute to age-related disease. (The characteristics of ageing are described by scientists as the '12 hallmarks of ageing', published in the journal Cell in January 2023).

Our effective biological age can differ from our chronological age, also different parts of our body age at different rates, some organs may be effectively older than our age from birth, some may be effectively younger. It is not just genetics, it can depend on environment, lifestyle and how well we are looking after ourselves. There are no guarantees but, yes, we can make a difference if we are aware and work at it.

From middle-age onwards, commonly regarded as around 45-65 years of age, we may start to suffer from one or more age-related non-infectious diseases, such as cardiovascular disease (heart/blood circulation system), cancer, type 2 diabetes, dementia; there are many more. Also, as we explain in the Physical Activity and Exercise section, our muscle strength declines with age, as may our bone density, with consequences if we do not act. Maintaining muscle strength as we age gives us the capacity to stay physically independent in our own homes, to walk around, lift things, and reduce the risk of falls and injury. We also quote in Section 2 to 'exercise at any age'.

Our brains can begin to shrink from about the age of 45, so while our mental capability should still be good at that age, commencing action to boost our 'cognitive reserve' for the future is important.

It also becomes vital to maintain, and even increase, our social links as we age.

Cancer and ageing

Cancer can strike at any age, but the older we get the more likely it becomes.

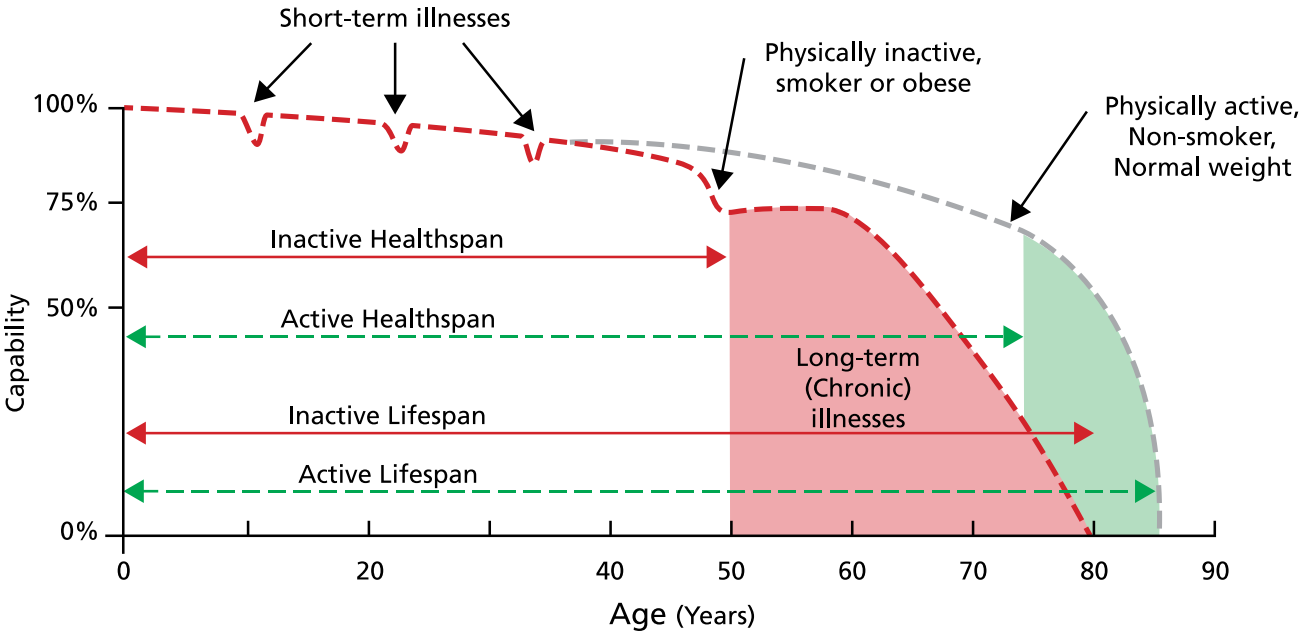
Half of diagnoses are in people over 70, according to Cancer Research UK…Cancer is caused by mutations in DNA, and these accumulate as we age - partly as a function of time, but also because DNA protection and repair mechanisms deteriorate with age.

It also becomes vital to maintain, and even increase, our social links as we age.

NHS national cancer screening invitations, for early detection of cancer of persons without symptoms, are age-related. Currently only bowel, breast and cervical cancer are screened. Large prostate cancer screening trials have been announced in 2024, although it may be some years before any national prostate cancer screening is available.

Prostate cancer usually affects men aged over 40 and typically many men can be around 70 before it is discovered. Individual men aged 50 and over are entitled to a Prostate Specific Antigen (PSA) blood test from the

Stay healthier for longer



Note: this diagram has been adapted from that on page 246 of the book 'Exercised' by Daniel Lieberman (itself an illustration of James Fries model)

NHS, by asking their GP. Alternatively through private healthcare checks, or by applying to join charitable-funded large PSA testing events, such as those organised by PCaSO and its partner charities. (For more details of the prostate and the PSA test refer to the PCaSO Knowledge Empowers 'Prostate Cancer Information booklet', viewable on our website www.pcaso.org)

Skin ageing – "Aged skin is worse than young skin at pretty much everything it is supposed to do. It's barrier functions weaken, wounds are slower to heal, sensitivity to touch declines and its immune defences are compromised. Aged skin is also more prone to cancer… we do however have one method for preventing skin ageing: sunscreen, which absorbs UV rays before they damage skin cells". **[8]**

As well as sunscreen, wearing hats, sunglasses and clothing with long sleeves, also minimising sun exposure when UV levels are high, can be protective, to reduce skin ageing effects and cancer risk. UV levels canbe checked on a weather forecast such as the Met office app.

'Healthspan'

"What we do want is to stop the last years of life being lived in ill health" says Janet Lord at the University of Birmingham, UK… It is about extending 'healthspan', the number of disease free years towards the end of life… An average of 20% of life is now spent in a state called 'late life morbidity' which is a jargony way of describing a daily battle against an ever -growing burden of chronic diseases. **[9]**

…many of the diseases that kill us slowly today are *mismatch diseases* caused by our bodies being imperfectly or inadequately adapted to modern environmental conditions like smoking, obesity and physical inactivity. Although these diseases are commonly classified as diseases of ageing because they tend to arise when we are middle-aged, they are not caused by age nor should they be considered inevitable consequences of ageing…
If many so-called diseases of ageing are preventable, it follows that a slow demise at the end of life is not inevitable. In a celebrated study Stanford medical professor James Fries showed that preventive medicine could help people stay healthier for longer…Fries 'compression of morbidity' model is a useful way to think about the effects of physical activity on ageing. In a nutshell, persistent physical inactivity along with smoking and excess body fat are the biggest three factors that influence the likelihood and duration of the major illnesses that kill most people who live in industrial, westernised contexts. **[10]**

A sense of purpose can provide motivation and end up pushing people into activities that build cognitive reserve.

As we get older our immune system ages as well. Neutrophils, a common white blood cell, may lose their bearings and cause tissue damage and inflammation. There is some evidence that older adults doing 10,000 steps a day had neutrophils as good as in young adults. Exercise may also be good for our T-cells, and for stimulating macrophages. Keeping your weight down is good, as being obese may suppress the immune system. Looking after your gut microbiome with probiotics may enhance the immune system, as may a varied diet rich in fibre, plant matter and fermented foods. For more details see Chapter 3.

Brain Health

Keep your brain young as you age

'find activities that boost what is known as 'cognitive reserve'…spare mental capacity, a kind of extra padding that allows your brain to sustain more damage before you feel the effects…A sense of purpose can provide motivation and end up pushing people into activities that build cognitive reserve. It tends to make you more active and more social…Musical training and speaking a second language both help the brain to work more efficiently, requiring less energy to accomplish the same cognitive tasks…Exercise helps promote a healthy brain and mind… **[11]**

Eat more 'superfoods'…many superfoods are staples in confirmed brain-healthy diets like the MIND, DASH and Mediterranean diets…focus on eating 'superplates'… choices include: berries, whole grains, fatty fish, nuts, olive oil, cruciferous vegetables (broccoli, brussel sprouts, cauliflower), avocados, green tea. **[12]**

Dementia prevention, intervention, and care

Professor Robert Thomas explains how the best way to avoid dementia is to start approaches before symptoms develop (Published February 2024) see below and link: *https://www.nationalworld.com/health/plants-that-help-brain-function-and-protect-us-from-dementia-4520124*

'Once noticeable memory loss and other signs of dementia have developed, a lot of the brain cells have already been killed but it's never too late to make positive dietary and lifestyle changes. Many well conducted scientific studies have confirmed that dietary strategies, particularly those which boost plant intake can slow the rate of damage and ensure the remaining brain cells, as well as delicate neuronal connections are running as efficiently as possible.

Obviously, the best way to avoid dementia is to start these approaches before symptoms develop - as early in life as possible. Distinctive types of dementia are influenced by different lifestyle factors although

12 dementia risk factors identified by the Commission in 2020 as increasing risk were:

- **High blood pressure** a systolic pressure higher than 140
- **Drinking** more than 21 units of alcohol a week
- **Obesity** a BMI of more than 30
- **Smoking**
- **Physical inactivity/lack of exercise**
- **Diabetes**
- **Having had less education** increases risk, but using your brain all your life increases 'cognitive reserve' and lowers dementia risk
- **Hearing loss** increases risk by 90%, but wearing hearing aids reduces that risk
- **Traumatic brain injury** from concussion, skull fractures, repeated head impacts
- **Social isolation**
- **Depression**
- **Air Pollution**

In 2024 the Commission added two additional factors (making 14 in total):

- **Untreated vision loss**
- **High (LDL) cholesterol** *(studies of participants below the age of 65)*

For full details see the 2024 report of the Lancet standing Commission Published: July 31, 2024 *https://doi.org/10.1016/S0140-6736(24)01296-0*

there is considerable overlap. **Vascular dementia** is mainly caused by untreated high blood pressure, high cholesterol, smoking and lack of exercise whereas **Alzheimer's** is linked to chronic inflammation caused by an ageing, ailing immune system, accelerated by unhealthy dietary habits and a sedentary lifestyle. Both types of dementia are strongly influenced by the phytochemicals, fats and micronutrients found in many edible plants we should all be eating more of, on a daily basis.' *(See Section 3 for more dietary information).*

Extracts below are from The Sunday Times 28 July 2024 article 'Almost half of dementia cases are caused by factors within your control' As people live longer, the number of people who live with dementia continues to rise… emphasising the need to identify and implement prevention approaches. Evidence is increasing and is now stronger than before that tackling the many risk factors... reduces the risk of developing dementia:

On 10th August 2024, shortly after the Commission report was published in an article on page 15 of New Scientist International magazine it was stated *'14 modifiable risk factors for dementia have been identified, 45% of cases may be preventable by eliminating these factors, but genetics and old age still have the greatest influence on a person's chances of developing the condition'*

'The researchers used models to estimate that out of all the risk factors, hearing loss and high cholesterol had the greatest impact, each contributing to about 7 percent of dementia cases, while excess alcohol and obesity had the least influence…however being associated with dementia doesn't mean these factors cause the condition, says Dylan Williams at University College London, who wasn't involved in the report. The estimates are also averages for the whole population, so don't capture individual risk, he says.'

Ageing well – to age well and hopefully live a long, healthy and fulfilled life, it is best to start early and look after our bodies, our brain and its mental health. A positive attitude can reap benefits and there is a useful expression "don't act your age!", meaning to keep a youthful feeling, and not to accept that decline in later life is inevitable. We can slow ageing by our own actions and interventions right now. In the future drugs, known as senolytics, may help in this as well, but we need to help ourselves first.

Bone Health

Bone development

Extracts below are from the paperback book 'The Story of the Human Body' by Daniel Lieberman, pages 299-305

> Bones have to bear a lot of weight, store calcium, house bone marrow, and provide sites for muscles, ligaments and tendons to attach. Bones have to grow and thus change size and shape throughout life without compromising your ability to function. When damaged they also need to repair themselves. The initial shape of a bone is highly controlled by genes, but for the bone to develop properly it needs appropriate nutrients and hormones to grow in concert with the rest of the body…A growing bone that doesn't experience enough load will remain weak and fragile… People who played lots of tennis as youngsters have bones in their racket swinging arm that are up to 40 percent thicker and stronger that their other arm… children who run and walk more develop thicker leg bones…your skeleton's ability to respond to mechanical loads during development is especially adaptive…once the skeleton stops growing up, bones cannot grow much thicker…your skeleton attains its peak size soon after you become an adult, between eighteen and

twenty years in girls and between twenty and twenty-five years in boys. After then there is little you can do to make your bones bigger, and soon therafter your skeleton starts to lose bone for the rest of your life… they do however retain the ability to repair themselves, old and damaged bone is replaced by new, healthy bone. The repair process is often initiated by stressing the bone, the more you use your skeleton the more it keeps itself in good condition. Unfortunately not using your bones enough leads to bone loss.

(The Royal Osteoporosis Society has information about better bone health for everybody, including bone strengthening and associated muscle strengthening exercises. See https://theros.org.uk/).

Osteoblasts are the cells that make new bone and *osteoclasts* are the cells that dissolve and remove old bone. As you age and your skeleton's growth slows or ceases, osteoblasts produce less bone Giving oestrogen to postmenopausal women (oestrogen replacement therapy) slows or even halts their rate of bone loss. Men are also at risk, but less so than women because men convert testosterone into oestrogen in their bones. Older men, as their testosterone levels drop, create less oestrogen and also face rising rates of bone fractures…Millions of years of natural selection did not gear our skeletons to mature in the absence of plentiful physical activity along with loss of calcium, vitamin D and protein.

Bone Maintenance

Vitamin K2 is a key to turning off bone degradation. Osteoblasts secrete a protein called osteocalcin, which enables new calcium to be laid down into the bone. The synthesis of osteocalcin itself requires vitamin D3, whereas the calcium-binding properties of osteocalcin require vitamin K.

Vitamin K provides two critical benefits, it protects against excess bone degradation by turning off excess osteoclast activity. It then supports the critical role of new bone formation by enabling osteocalcin to pull calcium from the blood and layer it on to the bone…It is clear that maintenance of healthy bone density requires adequate levels of calcium, vitamin D, and vitamin K.

Extract below from 'The secret to healthy bones' By Dr Meghan Rossi, Daily Mail 13 Dec 2022

The one thing we can all do for our bones is to have calcium-rich food in two meals a day *(your body will absorb calcium more readily in smaller quantities)*..If your diet does not provide enough calcium for your body's needs (it's also required to help your heart to contract, digestive enzymes to work, your blood to clot and your nervous system to function), then it will be leached from your bones, weakening them.

Cancer treatments and bone loss

Extracts below are from Prof Robert Thomas' book 'Keep Healthy after Cancer', pages 133-145

After cancer and its treatments, the rate and magnitude of bone and joint problems significantly accelerates. Medical interventions for bone issues are often necessary so monitoring of bone density is important. Lifestyle factors can significantly influence the rate of development, reduce the severity of symptoms, improve physical functioning and prevent fractures.

It is clear that maintenance of healthy bone density requires adequate levels of calcium, vitamin D, and vitamin K.

Bone is a dynamic organ, continually remodelling itself in response to trauma, weight bearing, exercise and metabolic processes…Loss of bone density is a silent disease until the bones start crumbling or breaking, by which point it can be devastating…There are no blood tests available which detect bone loss…the most reliable test is a bone density scan (DEXA)… the machine provides a scale called a T-score.

Medical interventions which increase the risk of bone loss: …Hormones which stop sex hormone production (e.g. Zoladex)…chemotherapy, biological therapies which directly damage bones… drugs such as …warfarin, omeprazole and lansoprazole

Lifestyle factors which increase the risk of bone loss: Lack of weight-bearing physical activity, low body weight (BMI less than 20), drinking more than 3.5 units of alcohol/day, smoking, poor gut health, lack of sun exposure, calcium and protein-poor diets

Interventions for bone loss: …testosterone replacement is usually regarded as unsuitable for men with prostate cancer as it can encourage prostate cancer cells to grow. However, evidence is emerging that correcting a low level in men with low-risk prostate cancer may be appropriate and improve quality of life as well as bone density.

Calcium supplements - evidence suggest that they should only be taken if someone lacks calcium in their diet, or to support bisphosphonates therapies… Bisphosphonates, e.g. Zoledronic Acid (Zometa), or Alendronic Acid (Fosamax) are drugs that interfere with the cells that break down bone (osteoclasts), thus increasing bone density and reducing the risk of fractures. They have been shown to help age-related osteoporosis and prevent bone loss caused by hormonal therapy and other cancer treatments. They are also used to prevent or treat cancer that has spread to the

bone. It's usually necessary to take calcium and vitamin D supplements whilst on these drugs otherwise the calcium will drop in the bloodstream.

Denosumab is a targeted antibody treatment which also impairs osteoclastic activity…the same benefits for bone, but they do not have the same anti-cancer properties as bisphosphonates

Professor Robert Thomas's summary advice to help bone density:

- Avoid excess alcohol and try to stop smoking. Reduce meat intake to less than 3 times a week
- Avoid being underweight
- Exercise and stretch your joints every day; do more weight-bearing exercise
- Consider a High-intensity resistance and impact training programme
- Increase plant proteins
- Ensure adequate Vitamin D levels, avoid calcium deficiency, ensure adequate vitamin K2 levels
- Increase foods which promote a healthy gut

Note: for information on foods to eat for bone health, see Section 3

CHAPTER 3

Immune System, Gut Microbiome, Vagus Nerve, Oxidative Stress, Inflammation

Immunity and the body's defences

The immune system is the body's natural defence system, an incredibly complex network of cells, molecules, organs and tissues, that is second only to the brain in it's complexity. It has both physical outer barriers and an internal network of defenders. It protects us by recognising and healing injury and dealing with other threats that might make us unwell, such as toxins, invading viruses and bacteria (pathogens).

Physical barriers. The skin is a primary barrier, when the skin is damaged the immune system moves rapidly to repair it and protect the body from any infection in the wound. A number of immune cells live in the skin dermis, (mast cells, macrophages and granulocytes). Mast cells detect the injury and release histamine to increase blood flow to the area. Other cells are called to help with the repair.

The gut lining is another important barrier.

The lymphatic system is a network of organs and vessels that collect the *lymph* that has drained from the bloodstream into bodily tissues and returns it to the bloodstream. It is a key part of the immune system.

Bone marrow is where lymphocyte white blood cells are produced. The *Thymus* gland, located on the breastbone, is where lymphocytes produced by bone marrow mature into specialised T-cells. The thymus gland is most active in childhood, but shrinks during adulthood, which may lead to reduced effectiveness in the elderly.

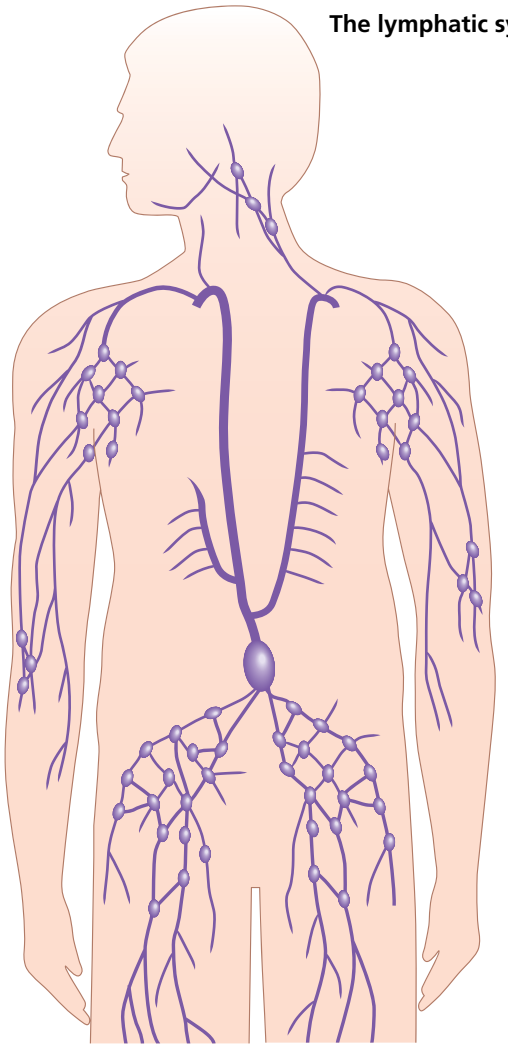
There are several other parts of the lymphatic system, e.g., the tonsils and the spleen.

The **two arms to the immune system** are the non-specific (innate) part which provides general defence (front-line troops). If the innate immune system has not contained the threat within about 12 hours the specific (adaptive) immune system is activated. The adaptive part has memory B-cells and (like with vaccines) the next time it recognises a similar threat, it already knows what to do and immediately releases antibodies to mark these harmful invading cells for attack and destruction before they can take hold.

The body is daily neutralising threats without us realising it, by means of the patrolling killer T-cells of the immune system. When the T-cells find a target they multiply and signal other immune cells of the threat. ***Cytokines*** are the messenger molecules helping coordinate the response to the invasive threat or cancer tumour.

Cancer - The immune system also deals with abnormal cells of the body itself, such as caused by DNA damage or DNA replication errors, or by chronic inflammation

The lymphatic system



or oxidative stress (see page 14). These 'rogue' cells can be pre-cancerous, or transforming into cancer, or have matured fully into cancer. As with pathogens the immune system will attempt to kill off potential cancer cells, but if cancer develops it can evolve and mutate to hide from T-cells, or cancer can switch-off the immune response *(hence the research and development of immunotherapy as an emerging cancer treatment. See also page 56 'Immunotherapy', in PCaSO booklet 'Knowledge Empowers'*).

The Gut and its role in Healthy Living

The health of the digestive system is fundamental to our overall well-being. Study after study links imbalances in the digestive system to the development of long-term disease. Each person has an entirely unique network of microbiota. A person is first exposed to microorganisms as an infant, during delivery in the birth canal and through the mother's breast milk. Exactly which microorganisms the infant is exposed to depends solely on the species found in the mother. Later on, environmental exposures and diet can change one's *microbiome* to be either beneficial to health or place one at greater risk for disease.

The Gut Microbiome

The 25 feet of tubing that runs from the mouth to the anus (see diagram), is populated with a huge number of bacteria. **Trillions of bacteria and other microbes live in your gut and make up your individual gut microbiome. These microbes influence many aspects of your health, including your immune system, and they help digest the food you eat.**

Your diet is key to making sure that your gut microbiome is in good shape to support your health.

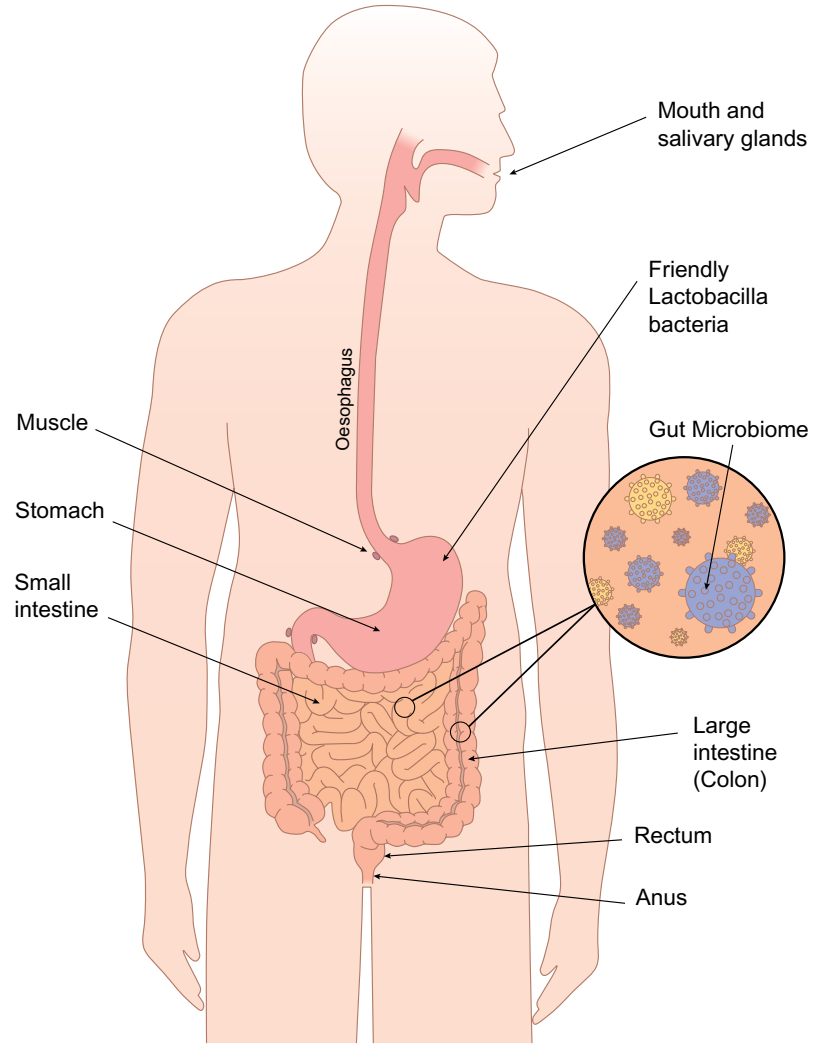
Fast facts on the gut microbiome:

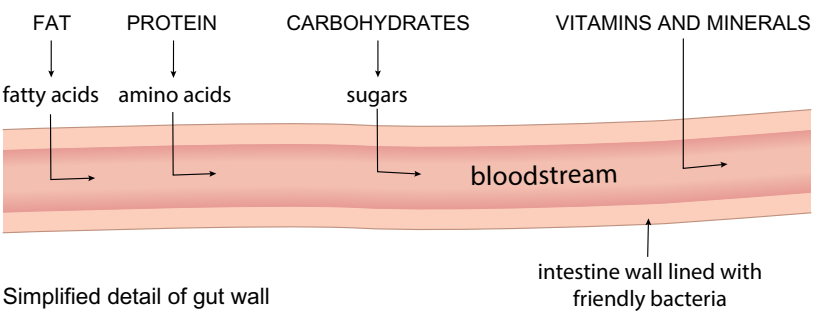
- Your gut microbiome is the collection of all the genetic material from the microbes in your gut. It contains around 3 million genes. *(Ed: genetically separate from our own body's cells and DNA).*
- Gut microbes digest fibre from your food, shape your immune system, and help protect you from pathogens.
- Your diet is a key factor in determining which microbes are in your gut.
- Fibre-rich, minimally processed foods support a healthy microbiome.
- Ultra-processed foods promote the growth of harmful microbes.

Ref: *https://zoe.com/learn/the-gut-microbiome-and-your-health?*

When 'bad' Bacteria Take Over

High carb, low fibre diets promote an imbalance of gut bacteria, called *Dysbiosis*. Research has acknowledged that your diet will affect the balance of microbes in your gut. The war within your gut determines your health, as declining levels of 'good' bacteria allow overgrowth of harmful 'bad' bacteria (*C.difficile, Salmonella, E.coli*), yeast (*Candidiasis*) and parasites to damage your gut and health overall and can lead to 'leaky gut syndrome'. Some types of bacteria will flourish, while others decline changing your bowel environment. The changes trigger different chemicals to be secreted, different nutrients to be absorbed and different





Simplified detail of gut wall

genes to be activated. In fact, it's a two-way street as your gut communicates with your brain via the 'Vagus' nerve through hormones, neurotransmitters and inflammatory chemicals secreted by the trillions of gut bacteria which can influence your behaviour and mental health.

Dysbiosis may be caused by:

- Alcohol, Caffeine, Cigarettes, Junk Food and Stress
- Antibiotic overuse
- Chlorine found in most tap and bottled water
- Constipation (Increases Bad Bacteria)
- Drugs including Painkillers (NSAIDs) and Birth Control Pills
- Gallbladder Surgery (Lack of Digestive Enzymes)
- High Fat/Meat Diet (Slower Digestion increases Bad Bacteria)
- Non-Organic Meat, Chicken and Dairy (containing Antibiotics)
- Radiation and Chemotherapy
- Stress (Physical and Psychological)

Ref: *https://getnaturopathic.com/gut-bacteria-cravings-the-war-within/*

The Vagus Nerve

Gut feelings are real; the vagus nerve communicates through the **Microbe-Gut-Brain Axis** and is the bi-directional flow of chemical information that explains how your gut bacteria can influence your mental, emotional and physical health. It balances the nervous system and helps with major functions that keep us alive. The vagus nerve connects and communicates with vital organs in the body that include the brain, heart, lungs, gut, liver, spleen and kidneys all of which work together to allow the bidirectional communication between the gut and brain. It is responsible for functions such as rest and digest, heart rate, sexual arousal, salivation, and urination. The vagus nerve also controls your muscles for speaking, swallowing and tells the lungs to breathe, to slow our pulse and tells our body to chill out. Dysfunction or damage to the vagus nerve can lead to a variety of symptoms, including digestive issues, heart problems, and immune system dysfunction.

Your dietary choices are derived from your gut bacteria secretion of countless chemical signals travelling through your blood, lymph and the vagus nerve. This pathway of millions of nerve cells connects your entire digestive tract to your brain. The power of the vagus nerve is evident through various research that shows that stimulating the vagus nerve triggers excessive eating, whereas blocking the vagus nerve leads to weight loss. This is the influence and bi-directional flow of the microbe-gut-brain axis.

Ref: https://getnaturopathic.com/gut-bacteria-cravings-the-war-within/

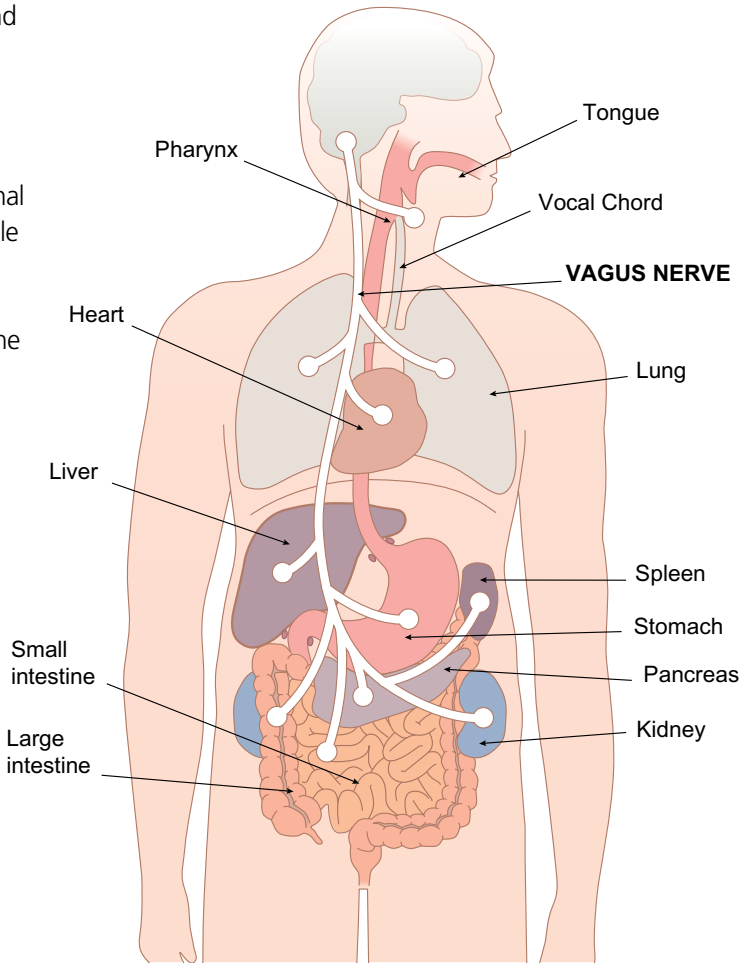
The Gut and Prostate Cancer

Lifestyle, especially diet, plays an important role in the development and progression of prostate cancer. Recent studies have revealed a connection between the gut microbiome and prostate cancer…. Additionally, the gut microbiota can serve as a source of testosterone, which affects prostate cancer progression. Men with castration-resistant prostate cancer have an increased abundance of gut bacteria with androgenic functions…. Lifestyle modifications can improve the gut microbiome. Furthermore, altering the gut microbiome using prebiotic or probiotic interventions may prevent or delay prostate cancer development. Further study into the "Gut-Prostate Axis" would help in the discovery of new strategies for the prevention, screening, and treatment of prostate cancer.

Ref: "Gut microbiome and prostate cancer" (Kazutoshi Fujita , Makoto Matsushita , Eri Banno , Marco A De Velasco , Koji Hatano , Norio Nonomura , Hirotsugu Uemura) https://pubmed.ncbi.nlm.nih.gov/35388531/Aug 2022

Does Gut Bacteria cause Prostate Cancer?

How does advanced prostate cancer continue to grow, despite hormone therapy? A new study [still ongoing in July 2025] implicates bacteria in the gut that makes testosterone, fuelling the tumour. This groundbreaking insight may also offer a new approach to treatment.



Professor Johann de Bono, the Institute of Cancer Research London and the Royal Marsden Hospital is studying how gut bacteria can cause prostate cancer. The researchers aim to develop a test to detect these bacteria, which could give an idea of a man's risk of prostate cancer. They also aim to find ways to prevent or treat prostate cancer by changing the gut bacteria.

The research, in its early stages, reveals that the initiation of hormone therapy for prostate cancer can trigger 'gut bugs' to start producing androgen hormones. Particular signatures have been identified among gut bacteria found in patients with prostate cancer on ADT, those that had higher amounts of certain types of bacteria in the gut (*Akkermansia* and *Ruminococcus*) were found to have the ability to make androgens, which could indicate that some men with prostate cancer who have these gut bugs are more likely to develop resistance to hormone therapy. The next step will be to further explore these signatures in patients, with the aim of devising tests to pick out men who would benefit from procedures to manipulate the microbiome. The long-term aim for the future, the research team hope to produce a 'yoghurt' enriched with favourable bacteria to prevent resistance to treatment, which can help men live longer.

Oxidative stress

Pollution, smoke and burnt food can contribute to a harmful build-up of 'free radicals' inside our cells, upsetting the oxidative balance. There are biological defences inside each of our cells, protecting and repairing its DNA. (These are not actually part of the immune system, which is outside of the cells). Free radicals can dash about in cells damaging DNA and leading to mutations if growth genes are damaged. Anti-oxidant enzymes can moderate oxidative stress caused by 'free radicals' and so keep a healthy balance within the cell. Daily eating a range of colourful vegetables, fruit, legumes, herbs and spices can help the anti-oxidant system work properly.

Inflammation

Acute inflammation plays a critical role in our body's immune defence and is a rapid and normal response to bacterial and viral threats (pathogens), infections and injuries (e.g. cuts and bruises). The four signs of acute inflammation, such as in wound healing, are redness, heat, swelling and pain. There can also be loss of function. Acute inflammation is temporary and short-term (e.g. days or weeks) and normally subsides after the healing repair process is completed, or the foreign invader (pathogen) is defeated.

Chronic inflammation however, is longer-term, e.g. months or years, where the immune system is over-working and over-active in its inflammatory response, which can be highly detrimental to our health In many respects.

Chronic inflammation
(a hidden smouldering fire within)

Chronic inflammation can be a trigger for many diseases including cancer and may be caused by smoking, air pollution, stress, obesity, poor diet or lack of physical activity. High blood sugars can indicate a likely level of chronic inflammation, as can belly fat.

According to the World Cancer Research Fund/American Cancer Institute Continuous Update Project Expert Report 2018, 'The Cancer Process', **obesity** can cause chronic inflammation, predisposing to both cardiovascular disease and cancer, by an accumulation of *macrophages* (immune system cells) in adipose tissue (fat), generating inflammatory cytokines and free radicals.

Dietary causes of chronic inflammation may be: Artificial ingredients in processed foods, processed meats, refined grains such as white bread / flour / pasta, refined vegetable oils (omega-6 fatty-acids) often found in processed and fried foods. (For many people gluten can be a source of intestinal inflammation and discomfort, and intake for such people should be reduced where possible). Some degree of chronic inflammation can also be caused by animal products such as red meat, dairy products, eggs and cheese.

Healthy fats, fibre-rich foods, probiotics and exercise all help to reduce chronic inflammation

Healthy fats, fibre-rich foods, probiotics and exercise all help to reduce chronic inflammation.

For more details of anti-Inflammatory foods see Section 3, 'Healthy Eating'.

Extracts below from the book: *A Silent Fire – The Story of Inflammation, Diet and Disease, by Shilpa Ravella, published in 2022. - pages 257 – 261.*

Fasting and chronic inflammation 'The mild stress of a fast shifts the body's attention away from growth and towards repair and reform as it clears or recycles molecular garbage, mends DNA, and renews cells, further dampening inflammation…Eating all of a day's calories in a window of around eight to ten hours is one of the simplest ways to fast, reaping some of the same benefits as lengthier fasts and allaying the inflammatory actions of macrophages.'

Exercise and chronic inflammation 'Dozens of human clinical trials across age-groups show that regular exercise tones down chronic, low level inflammation…Exercise calms inflammation through many routes. It melts inflammatory abdominal fat and, even in the absence of weight loss, lowers the number of macrophages that infiltrate fat tissue and

churn out inflammatory cytokines. It manipulates microglial behaviour, preserving brain function. It shrinks inflammatory fat around blood vessels and alters macrophages in artheroscotic plaques, helping to ward off heart disease and strokes. It improves gut microbial diversity.'

Stress, Sleep and chronic inflammation 'In the modern world, it is not the rare deadly predator but frequent spells of familiar stressors, real or imagined, that collude to damage health. The loss or illness of a loved one. A harrowing divorce. An irate, bullying boss, or burnout on the job. Excessive exhausting friction with family or friends. Poverty and its multitude of handicaps. Or loneliness, an intense stressor for a species adapted to tribal tendencies for survival. These and other misfortunes…tend to spur hidden inflamation…an increased risk of many illnesses, including heart disease, obesity, diabetes, cancer….

Stress alters the action of immune cells. Macrophages become angry and maladaptive, pumping out greater numbers of inflammatory cytokines. Stressful situations…are tied to a rise in blood markers of inflammation like CRP…Often multiple stressors operate in concert to compound inflammatory effects. A lonely individual for example, is more likely to become inflammed when beset by challenges at work, than someone rich in social support

…Sleep loss can feed hidden inflammation and disease. So can disruption of circadian rythms, which happens with certain changes in sleep patterns or when facing artificial light, particularly blue light, long after sundown.'

Air Quality and chronic inflammation 'Air quality, from pollutants and smoking to the onslaught of chemicals that suffuse modern goods, can inflame both old and young. All parts of polluted air are harmful to humans, but fine particles from sources like vehicle emissions, industrial processes or wildfires, are particularly noxious. In the home, high-heat cooking fumes can pollute our bodies…Hidden inflammation is a central mechanism by which pollution leads to poor health. The immune system recognises and responds to pollutants as it does to germs

Macrophages, our initial defence against the air we breathe, rest in the tiny air sacs of the lungs and become incensed upon encountering pollutants. Particles from cigarette smoke can still be found inside these macrophages even years after a person quits the habit.'

Obesity, Inflammation, and Prostate Cancer
Feb 2019 (Japan)

'Epidemiological studies have shown that obesity is associated with advanced prostate cancer and that obese men with prostate cancer have a poorer prognosis… Inflammation and immune responses play important roles in the progression of prostate cancer. Other inflammatory cells and immune cells could be also involved in the prostate cancer progression… Another possible mechanism to affect prostate cancer in obesity could be an intestinal microbiome. High-fat diet changes the intestinal microbiome and enhances colorectal cancer and liver cancer.'

For more details see
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6406330/

CHAPTER 4

Food/Energy Balance helps avoid excess body fat

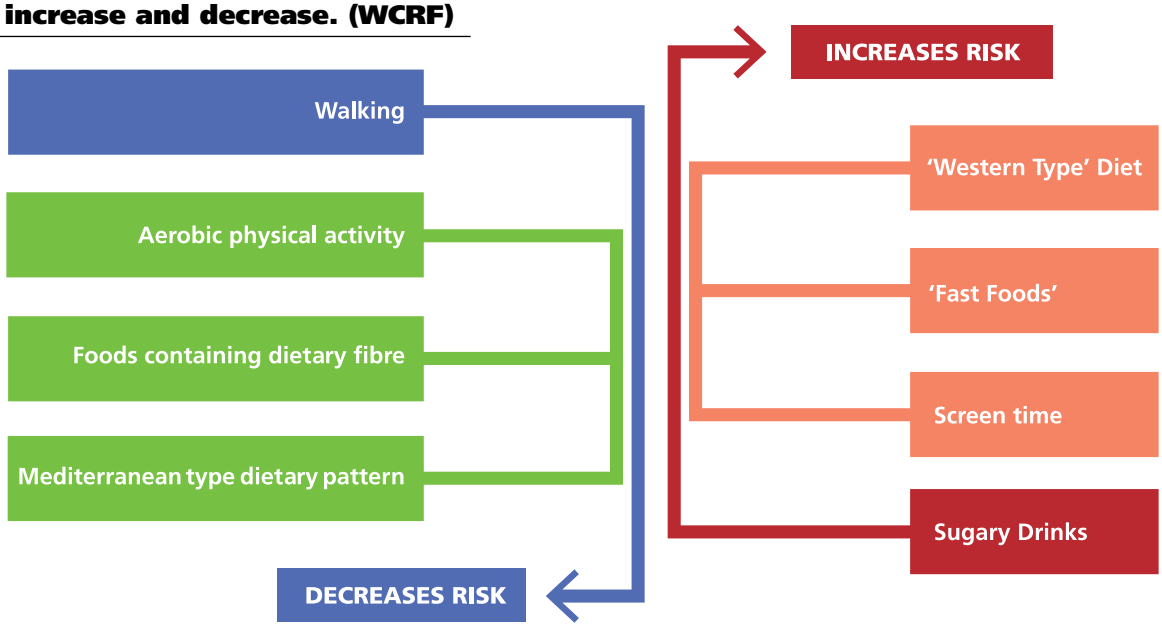
In recent decades a dreadful combination of factors in developed countries with a so-called 'Western lifestyle', have 'sleep-walked' people into eating and drinking patterns that make excess body fatness almost inevitable. We explained in Chapter 1 how being overweight can cause malfunctioning of the body. It can exacerbate blood sugar imbalances and in particular encourage cancer due to chronic inflammation and oxidative stress, things most of us have never heard of before, let alone understood what they mean! The message is quite clear however, *excess body fat is dangerous to our health*. It may worsen so many different conditions, not just cancer. It can shorten our lives, also lead to prolonged poor health in later years, hence reducing the quality of our lives, probably our mobility and agility as well and restricting what we might achieve.

Balancing food (and drinks) consumed against energy requirements is key to weight control. Simply put, if we consume more calories than we use as energy, most of us are going to put on weight over time. Studies have shown however that lots of exercise itself is not a way to lose weight. Healthy eating means being active and getting enough *nutritious* food to feed the needs of our bodies, but not too much! Beware of processed foods high in added sugars and fat and low in fibre, vitamins and minerals. They may taste delicious and hence easier to consume too many calories, but without providing sufficient beneficial nutrients for overall health. 'Fast food' is also something to be careful about, e.g. a large burger, fries and a sugary drink can themselves use more than 50% of a normal 'daily allowance', which is about 2500 calories for a man and 2000 calories for a woman.

Many bulky whole plant foods contain higher fibre, thus helping regulate appetite and reduce cravings.

'Don't eat too much in a single sitting. Studies have linked body fat distribution— such as having a lot of weight around your mid-section, with poor outcomes. Controlling portion size is one of the few ways to help fend off the belly fat'.
Ref: PCF Wellness Guide p.73

Risks – increase and decrease. (WCRF)



In their section on 'energy balance and body fatness' of their Third Expert Report, the World Cancer Research Fund International (WCRF) and the American Institute of Cancer Research, identify 12 cancers caused by, amongst other things, greater body fatness. These cancers include advanced prostate cancer.

WCRF also state the following:

'Increased aerobic physical activity, including walking, alongside consumption of foods containing dietary fibre, particularly wholegrains, fruit and vegetables, and higher adherence to a 'Mediterranean type' dietary pattern is more likely to decrease the risk of weight gain, overweight and obesity than modifying any given single exposure.

Conversely, increased sedentary time, including screen time, in combination with a 'Western type' diet, and consumption of sugar sweetened drinks, 'fast foods', and refined grains is more likely to increase the risk of weight gain, overweight and obesity than any exposure in isolation.'

CHAPTER 5

Mental Wellbeing, Social contact, Sleep and Stress Reduction

(and its link with recovering cancer patients)

It may not be obvious when we think about healthy living, but an understanding of how our mental wellbeing is achieved, and how to offset the impact of anxiety and stress, is as fundamental as ensuring we eat healthily and exercise regularly. This chapter is about the mind, spirit, motivation and purpose, and the interplay between mind and body. It is also about interfaces with other people.

Self-empowerment and purpose If you do not do so already, consider taking really active responsibility for your overall health. There is so much you can do to look after your body, your mind and your spirit, and there is connectivity between them. (see the following Chapter 6, for interfaces and teamwork with professionals in medicine and other disciplines).

Have a sense of purpose and meaning – a strong interest or 'passion' for something and acting on it can add meaning to your life. One option is volunteering for a charity or a community organisation. Having strong reasons for living should bring you fulfillment and happiness, leading to immune-boosting positive hormonal changes.

Make changes if there is a significant gap between your present lifestyle and what it could be so as to reduce your risk of cancer, then you may want to make radical changes. Where this will have consequences for other family members, then you may need to convince them of your resolve and discuss the changes and implications together.

Social contact and support

Engage with other people – understand that loneliness may lead to poor health, poor choices and even premature death. If you have a cancer diagnosis accept you cannot, and should not, deal with cancer on your own.

Socialise, in person, with friends or family – it is important to avoid loneliness and social isolation, whether or not you have cancer. Take time to meet friends in person for coffee or lunch. Join or start a regular activity group with friends who share the same interests. An active group such as a walking or swimming group may combine exercise with some socialising, so double benefit!

Avoid 'toxic' friends – it may seem harsh but it is best to be around positive and cheerful people,

especially when dealing with a cancer diagnosis, than mix with those with a negative outlook on life, who may depress you.

Build and nurture a support network – once cancer has been diagnosed, as a patient you need ongoing morale and practical support from family, friends and possibly neighbours or members of the local community. A charitable cancer support group, such as: PCaSO, Macmillan Cancer Support, Penny Brohn UK, or Maggies Centres, can be helpful and supportive.

A supportive and accessible medical team is also important, e.g. GP, urologist, oncologist, nutritionist and specialist nursing staff. Make and maintain the social and technical contacts so you are not alone and are well informed on your cancer journey.

Stress Unfortunately, many of us having news of a diagnosis or receiving treatment for prostate cancer will have experienced occasions where we are suffering with various degrees of anxiety and depression. Negative emotions and psychological stress can influence the body in many ways, including weakening the immune system, upsetting the gut microbiome and stopping cancer cells from dying. Stress is a very disempowering emotion, which can leave us feeling powerless and out of control.

The link between Stress and Cortisol – a person's exposure to chronic stress increases levels of the hormone cortisol, released by the adrenal glands, lowering immune function. Most cells in the human body have glucocorticoid receptors where cortisol can 'dock'. This means that when you have a response to stress, cortisol can affect almost every area in your body, which in turn leads to a weakened immune system and inflamed cells.

Prevalence of Stress amongst cancer patients – according to Professor Robert Thomas, 30% of people with cancer are found to have anxiety or depression. Furthermore, from a trial of 41,275 men with prostate cancer, they found a 40% higher prostate cancer death rate among men with a proven diagnosis of 'depressive illness'.

Sleep and our body clocks

Sleep well – we need between 6-9 hours sleep each night, (ideally about 7-8 hours). With the added complication of cancer, it's easy to find yourself still awake in the night, but your body needs time to rest and recover. Lack of sleep can increase your cortisol levels and may negatively impact your immune system. The stress hormone cortisol is also an important circadian rhythm hormone (the natural cycle of physical, mental and behaviour changes that the body goes through in a 24-hour cycle). This means that if you are under stress you may also experience sleep disruption.

You could also research information, such as the website *https://thesleepcharity.org.uk* or the NHS website *https://www.nhs.uk/live-well/sleep-and-tiredness/how-to-get-to-sleep/* or get advice from your GP practice on how to resolve sleep problems.

Stress relaxing techniques

Note: techniques such as Meditation, Mindfulness, etc. are only briefly described in this Chapter. It can be well worthwhile exploring them in more detail and possibly joining an instruction class or a group. Some links to websites are provided in 'Resources' on page 62.

Meditation – is a powerful calming and well-being technique, best practised daily. It's based on control of breathing and focusing on the intuitive part of the brain (rather than our overused logical thinking part) to help bring goodness and harmony into our lives

Mindfulness – is a well-established practice drawn from Buddhist teachings which focus attention on the 'present experience' and of being 'at one' with nature.

Some tips to help you prepare for sleep, and to sleep well are:

- Try and avoid caffeine after about 3 pm each day
- If you have an afternoon nap, do not sleep too long
- Have a walk or some exercise in the day, preferably before dinner
- Allow time (e.g. 3 hours) for dinner to digest before bedtime
- Relax and de-stress before bedtime, eg read, listen to music, or do gentle stretching
- Avoid phone, Ipad and computer screens about an hour before bedtime
- Do not have screens, tv or digital, in the bedroom, nor visible clock faces
- Have a quiet, cool (16-18C) and dark bedroom (darkness releases melatonin, a sleep hormone)
- Have a comfortable bed, mattress and pillow
- Have a regular pattern of going to bed and getting up every day, do not sleep-in to catch up. Ideally going to bed between 10 and 11pm can be better than later for most people, as it can align with our circadian rhythm and the day/night cycle. 11pm or later can also be worse for blood sugar levels.
- If awake in the night for 20-30 minutes, get up, walk around and write down any thoughts/worries

Visualisation – is a popular technique that has harnessed the power of the mind through various therapies for centuries. Visualisation involves creating a mental picture of a desired future outcome to a health or emotional issue.

Relaxation exercises – are complementary to meditation and can often be simple breathing exercises providing stress relief and calming to both mind and body.

Talking therapies – can be accessed free on the NHS, either directly by yourself or through your GP. Confidential help is available in person, by video, by phone, or as an online course, to deal with issues like anxiety, stress and depression. See the NHS website.

Other ways of reducing Stress

Yoga, Tai Chi and Qi-Jong – these practices have many benefits, for movement, flexibility and balance. They are also very helpful for calming the mind and body and reducing stress. (see Yoga, Tai Chi and Qi-Gong in Section 2 'Physical Activity and Exercise').

Exercise and Sport – when we exercise, our body releases chemicals called endorphins. These endorphins interact with the receptors in the brain that reduce the perception of pain and also trigger a 'feel good' feeling in the body. Endorphins also help your self-confidence, and improve mood-related disorders. (*see Section 2 'Physical Activity and Exercise'*).

According to Prof Robert Thomas, a study of 3000 participants found that doing at least 30 mins of exercise, three times a week, led to a 20% reduction in anxiety and depressive symptons. Also, the more exercise, the better the mood.

Listen to Music – suitable music for relaxation purposes can provide stress-reduction benefits. If opportunity exists get out and dance too.

Spend time relaxing in 'green spaces' – relaxing away from traffic and modern life pressures for 30 minutes or more per week in green spaces, woodlands, or by water, can be beneficial for mental wellbeing. Try it with Mindful Walking, where you are 'in the present moment' enjoying your experience, rather than thinking about things in the past, or the future.

Release your emotions – while many stress-reducing techniques focus on rerouting your negative emotions, sometimes it's good to experience sadness and anxiety. A few tears or crying improves mood for both men and women, perhaps due to parasympathetic nervous system activation, which helps your body calm down from a stressful situation.

Laughter decreases cortisol secretion (the stress hormone) so watch some comedy or just try and find something to laugh about each day. Even just hearing laughter may help your nervous system initiate a "rest and relaxation" response.

Dogs – pet ownership may alleviate stress Dogs in particular are great stress-reducing companions, also when walking them you may meet other people for a chat. If you do not have your own, you could offer to walk a dog for someone you know.

Faith and spirituality – a delicate subject. However, there are many advocates that physical healing is helped by one's connection to a deeper (or higher) energy. Whatever your thoughts or beliefs, it does seem an element of faith or spirituality may be conducive to help in the relief of stress and anxiety too.

Seek Help – there are experts out there skilled in stress-management therapy. Many people have found, that like many things in life, the expense of working with a skilled practitioner is worth the investment many times over.

A great source of help can be ***Penny Brohn UK*** – a holistic cancer charity based in Bristol. They recognise that all parts of ourselves – mind, body, spirit and emotions – are all closely connected and work together to support our immune system and its ability to keep us well. Some PCaSO members have attended Penny Brohn courses and highly recommend them.

Penny Brohn's approach is based upon research into Psychoneuroimmunology (PNI), the study of the connections between our mind (psycho), nervous system (neuro) and immune system (immunology), since changes in our thoughts, emotions and beliefs may bring about changes in our physical health and wellbeing. PNI is about building resilience into every aspect of life and supporting the body's natural ability to heal and repair itself. See Penny Brohn 'What is the Bristol Whole Life Approach?' (page 19).

CHAPTER 6

Health checks consultations and support

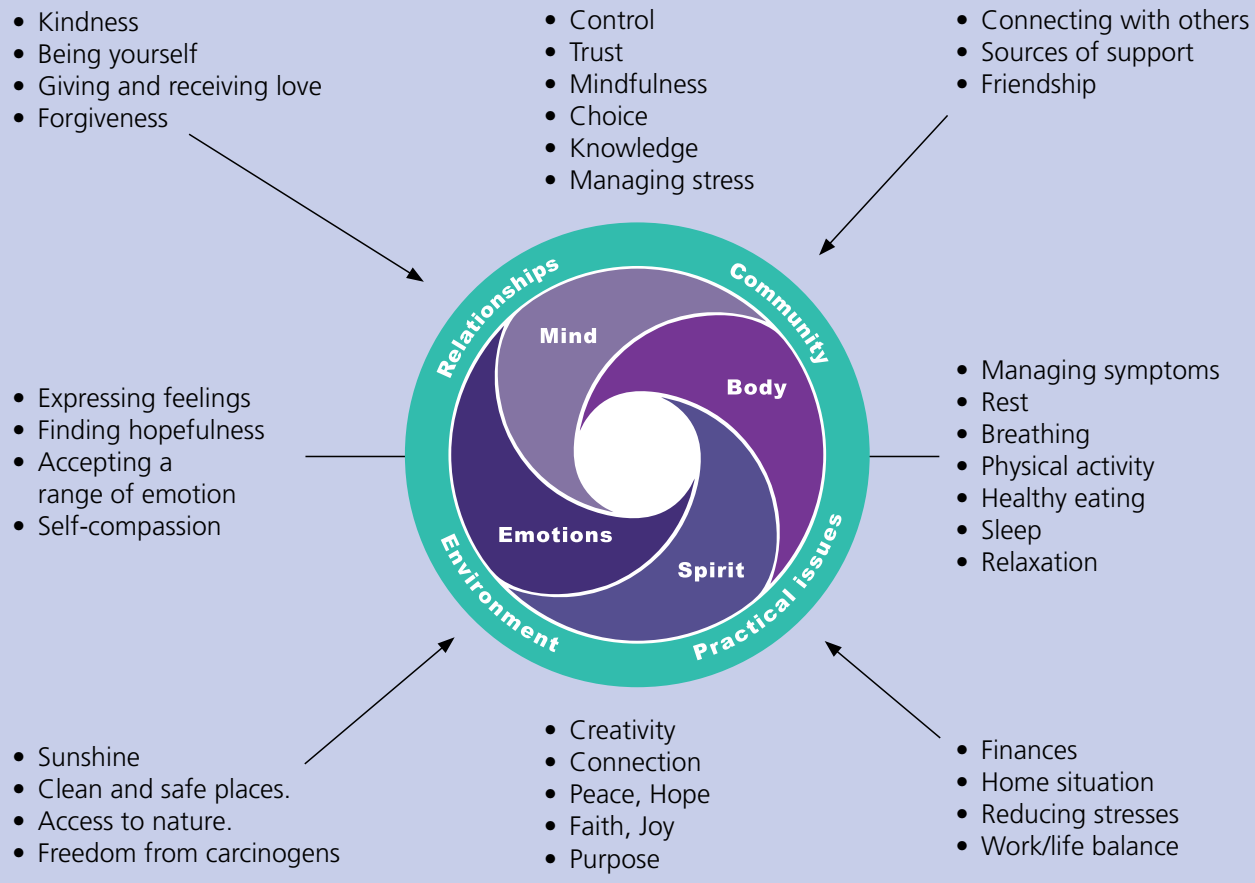
Your health belongs to you, so you may well benefit if you work together with medical and other health and fitness professionals on lifestyle aspects, routine or wellness tests and cancer screening, also eyesight and hearing checks (opticians and audiologists) and dental checks for oral health, including cancer.

Medical staff frequently work under busy pressures so we may not always receive the time and personal continuity we might wish for. Being pro-active and knowledgeable as a patient may be to your own benefit. (See also the PCaSO booklet 'Knowledge Empowers').

What is the Bristol Whole Life Approach?

Penny Brohn UK
Living Well with Cancer

- The Bristol Whole Life Approach recognises that to be healthy we need to pay attention to all parts of ourselves. Specifically, our mind, body, spirit and emotions, which are all closely connected and work together to support our immune system and its ability to keep us well.
- We strengthen our immune system by eating well, physical activity, doing the things we love and managing stress.
- By learning how to self-care and increase our resilience, we are better able to face whatever life throws at us.
- This powerful knowledge offers hope and a sense of control for those with a cancer diagnosis.
- It doesn't mean we are offering the promise or expectation of cure.
- It does mean we can confidently say we each have natural internal resources that, when supported in the right way, can have a powerful effect on our health and well being.



Medical checks and tests – as applicable to your age, ensure you are offered and take cancer screening and regular check-ups and blood tests. For example Body Mass Index, your waist measurement, PSA values (for prostate as applicable), blood pressure, cholesterol, minerals and Vitamin B12. You may also wish to monitor test result trends over time. If you have online access, such as through the NHS app and 'Patients Know Best', you may be able to view your latest test results and charts of previous and current test results.

If your checks include them, the 'C-reactive protein' (CRP) blood test is an indicator of inflammation and hence immune function, whereas the HbA1c blood test measures average blood sugar levels over the previous three months (used in monitoring of Type 2 diabetes).

Medical consultations and diagnosis – prepare for the appointment in advance and ask for further information, or a second opinion, or time to consider treatment options. Otherwise you might be pressured into instant decisions, or not be fully informed about all the options, or side-effects, things you may later regret.

It may not be easy for you to process treatment proposals and side-effects described by your consultant when you are in shock and stressed by a cancer diagnosis. It may be helpful to have a suitable friend or family member

with you to listen in, and perhaps take notes, when you are to receive a diagnosis or discuss options with your consultant. Alternatively your consultant might agree to you recording the meeting so you can play it back later.

A short period, e.g. a few days or a week, of reviewing information, and consideration before you ask further questions and/or confirm your treatment choice, may be well spent (we suggest you refer to the PCaSO Knowledge Empowers booklet, page 16-18, for 'Questions to Ask', when seeing your consultant).

Support groups – why not join PCaSO, or another applicable cancer support group local to you, for sharing experiences with fellow patients? PCaSO have a number of Patient Stories on it's website. Some other Organisations and Charities that may be helpful are listed at the end of this booklet

Health and Lifestyle - Key Points

If you smoke seek help to stop. Smoking is toxic for the body, it also encourages many cancers, not just lung cancer.

If you drink alcohol, limit to 1 or 2 small glasses of red wine with a meal and a drink of water. Have two or three alcohol-free days each week.

Protect your mental wellbeing. Reduce stress and loneliness, socialise. Relax outdoors. Follow the Bristol Whole Life approach.

Sleep well by adopting good practices, we need 6-9 hours sleep to rest and recover.

Move! Sit less and keep active, e.g. do work in house or garden, dancing, golf, yoga, tai chi.

Exercise aerobically, e.g. walking, running, cycling, swimming, at least 30 mins a day, 5 days per week. If you can do up to 300 mins (5hrs) a week, even better!

Counteract ageing muscle loss by Strength Training, on two or three days per week, e.g. use resistance bands and weights.

Achieve and keep a trim waistline, below 94 cm (37") for men. Also aim for a Body Mass Index (BMI) of 21 to 23.

Avoid processed meats, charred meat and highly processed foods. Also avoid sugary drinks, sugary foods, added sugar.

Follow a Mediterranean dietary pattern, plus eat at least 30 different plant foods per week. Nourish your gut microbiome with fibre-rich foods and fermented foods.

Be proactive to protect your health. Get your medical checks, understand and 'know your numbers'. Prepare for appointments. Take advice from professionals. Act on concerns.

Protect your future health. Start in middle-age to build your muscle strength, protect your bone health and nurture your brain health.

SECTION 2

Physical Activity and Exercise

Since the first version of the Healthy Living booklet further information has come to light about the incredible importance to our health of physical activity and exercise, at all ages. At PCaSO we do recognise that many men, including many of our members and others affected by prostate cancer, already have very good fitness levels for their age and are active in a range of sporting and exercise activities. However we do hope that this section on Physical Activity and Exercise will have 'something for everyone' to learn and build on, at your own pace.

In this revised 2nd Edition we have added information selected from a 96-page book 'EXERCISE -the real science of physical fitness – New Scientist Essential Guide No.16', published 2023, and from the book by Daniel Lieberman -'Exercised'- the Science of Physical Activity, Rest and Health'.

The personalised nutrition company ZOE (co-founder Professor Tim Spector) publishes regular informative podcasts on healthy living (one can sign up for emails from ZOE). We include transcript extracts from a podcast in Chapter 3.

CHAPTER 1

Why physical exertion is essential for humans

Born to move

When our ancestors began hunting and gathering around 2.5 million years ago, it put an evolutionary premium on physical exertion…Over generations the human brain evolved to reward hard work, releasing endorphins and endocannabinoids - the body's homemade feel-good drugs - in response to endurance exercise. As we improved we became better hunters, able to track and outrun our prey over large distances, this helped to provide us with the extra protein we needed to acquire our greatest advantage: a bigger brain.

"Millions of people run marathons and people tell us we are crazy, says Lieberman, actually it's part of who we are". [1]

But recently, and in the blink of an evolutionary eye, our environment has changed…we have largely engineered away hunger, fear and the other demons that got our hunter-gatherer ancestors moving. We have made it easy to overindulge, leading to heart disease, obesity and other plagues of civilisation.[2]

Exercise is a great way to relieve stress and hence improve mental wellbeing.

Moving helps our lymphatic system.

The lymphatic system is an important part of the immune system, and is complementary to our circulatory system (arteries, blood, heart, etc), but does not have a pump itself, so relies on the movement of one's body to help 'pump' the lymph fluid around all internal cells and organs - this enables each cell's toxic excretion to be swiftly removed and processed, so keeping everything healthily flowing. Without exercise there is a risk of 'stagnation' in the lymphatic system (akin to areas of still/sluggish water in ponds and rivers) which can bring on the onset of ill health.

Develop an active lifestyle.

Finding ways to incorporate more movement into daily life helps keep muscles engaged. Work on developing an active lifestyle, plus some exercise. Physical activity improves the flow of blood supply, even gardening or cleaning the house can be beneficial. Try to spend less time sitting down and limit it to 30 minutes before getting up for a break. Move about while you watch TV, listen to the radio, music, or play active video games. Don't forget to stand up regularly if you sit down to work. If you are elderly, but do not do some physical activity, you risk experiencing a 'spiral of decline' leading to frailty, which may itself lead to falls and broken bones.

If you are feeling weary, move and get active, it can make you feel better.

Exercise. Regular exercise over the long term changes your energy metabolism, lowers inflammation and oxidative stress, and improves immune response. If you cannot stand up for long there are exercises you can do whilst seated.

Exercise is a great way to relieve stress and hence improve mental wellbeing. See '12 Useful facts - for everyone' on the next page.

Aerobic exercise ('cardio'). Aerobic exercise is any cardiovascular exercise (cardio) that gets the heart pumping. It can Include brisk walking, running, cycling, swimming, etc. It causes our muscles to switch to burning glucose (sugar) and fat. **HIIT (**High Intensity Interval Training) is a form of aerobic exercise explained In Chapter 4.

Strength training is another type of exercise, not often aerobic, but is an essential component of exercise to help our muscles and protect our bones. This Is explained in Chapter 4

CHAPTER 2

How much physical activity/ exercise do we need?

The World Health Organization recommendations are:

Adults aged 18–64 years

- should do at least 150–300 minutes of moderate-intensity aerobic physical activity every week; or at least 75–150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week
- should also do muscle-strengthening activities at moderate or greater intensity that involve all major muscle groups on 2 or more days a week, as these provide additional health benefits.
- may increase moderate-intensity aerobic physical activity to more than 300 minutes; or do more than 150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week for additional health benefits.
- should limit the amount of time spent being sedentary. Replacing sedentary time with physical activity of any intensity (including light intensity) provides health benefits, and

The essential health benefits of physical activity and exercise

12 Useful facts - for everyone!

1. Exercise keeps… our blood vessels pliant and improves aerobic fitness. When we get our heart rate up, the stresses imposed by the blood rushing through our arteries promotes the production of nitric oxide, which helps to repair blood vessels and keep them elastic. Maintaining strength and aerobic fitness is particularly important to us as we age.
2. Exercise can stimulate circulation, flush out fatty deposits in the walls of blood vessels and dilate small vessels that could otherwise be the cause of a heart attack or stroke," says Chi Pang Wen of the National Health Research Institute, Taiwan. He conducted a study of more than 430,000 Taiwanese men and women, showing that exercise reduced the risk of heart attacks by 30 to 50 percent.
3. Exercise also keeps blood vessels clear by helping to destroy the most dangerous fats, because it alters the structure of fatty trigliceride particles in the bloodstream, making it easier for enzymes to destroy them before they can gum up the works.
4. Physical activity helps you use up the extra glucose (sugar) in your blood. This can gradually lower your blood glucose levels. A modest weekly dose of exercise lowers the chances of developing type 2 diabetes by 58 percent.
5. Graham Hardie at the University of Dundee… says exercise has the potential to reverse obesity and diabetes and prevent cancer.
6. Exercise strengthens our hearts and muscles and can help our body regulate sugar and fats, keep our weight in check and can help keep cancer at bay.
7. Exercise triggers helpful suppressive effects all over the body. It reduces chronic inflammation, moderates levels of the reproductive hormones testosterone, oestrogen and progesterone and blunts our physiological response to stress. This suppression has big health impacts. Chronic inflammation and stress are indiscriminate killers, increasing the risk for heart disease, cancer, diabetes and other maladies.
8. Research is revealing how exercise keeps our brains fit too. Aerobic activity increases blood flow to the brain and causes the release of molecules that stimulate the generation of new brain cells and keep the old ones healthy.
9. Running, cycling and walking also challenge the brain to coordinate myriad signals involved in balance, navigation and movement, helping to maintain our cognitive reserve.
10. Regular physical activity makes your heart stronger. A stronger heart can pump more blood with less effort…which helps your blood pressure stay at a healthy level.
11. Physical activity raises your level of good cholesterol which carries away the bad cholesterol, so it is less likely to clog up your arteries and cause a heart attack or stroke.
12. Heart and circulatory diseases kill 1 in 4 people in the UK. Not being active enough is one of the reasons why people get heart and circulatory diseases like heart attack and stroke.

Extracts in this table are from 'EXERCISE - New Scientist Essential Guide, pages 11 to 13',
also from 'Understanding Physical Activity' leaflet, British Heart Foundation. bhf.org.uk]

- to help reduce the detrimental effects of high levels of sedentary behaviour on health, all adults and older adults should aim to do more than the recommended levels of moderate- to vigorous-intensity physical activity

Adults aged 65 years and above, or people living with chronic conditions (hypertension, type 2 diabetes, HIV and cancer survivors):

- as for adults 18-64 also…
- as part of their weekly physical activity, older adults should do varied multicomponent physical activity that emphasizes functional balance and strength training at moderate or greater intensity, on 3 or more days a week, to enhance functional capacity and to prevent falls.[3]

Research findings. A study in the US followed 4,840 people to see whether physical activity reduced the risk of dying over the next five to eight years. No surprise, it found that more active people had lower mortality rates. Just 25 minutes of moderate-and-vigorous activity a day reduced the risk of dying within this timeframe by 25% compared with the least active people. And more was better. Adults who were active for 100 minutes or more each day had the lowest mortality rates: 80 per cent lower than the "couch potatoes". These and other similar studies suggest that current public health guidelines set the bar too low, and we should strive for more.[4]

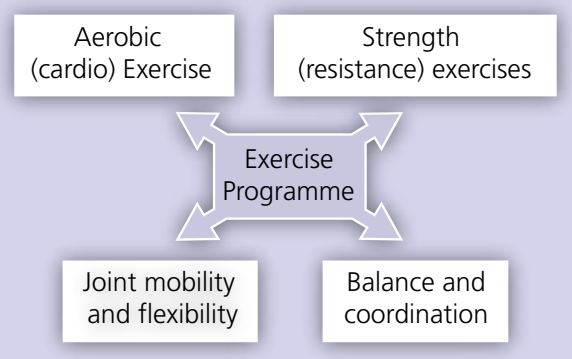
Studies consistently show that even modest amounts of exercise confer huge health benefits compared with a slothful existence. For the most sedentary among us, an

extra 30 minutes a day of activity that elevates our heart rate would halve our mortality rate, adding high quality healthy years to our lives… The best dose of exercise is the one that gets you coming back for more.

Higher exercise workloads may be particularly important for people who spend their days at a computer. A recent study of nearly 150,000 Australians found that it took over an hour a day of vigorous exercise to cancel out the ill-health effects of sitting (***for extended periods)*** during work hours.[5]

Physical activity and Exercise Programme

- At least 150-300 minutes of moderate intensity activity a week, or 75-150 minutes of vigorous activity, (or combinations of moderate and vigorous)
- Also undertake physical activity to improve muscle strength on at least two days per week.
- For cancer survivors, or those 65 years of age or over, increase this to three or more days per week for strength and balance training (to prevent falls)



CHAPTER 3

Exercise at any age

If one thing is becoming clearer than ever, it is that we need to throw out the idea that exercise and fitness are the preserve of the young, and that older generations should be putting their feet up. Keeping fit and strong into old age brings innumerable physical and mental benefits.

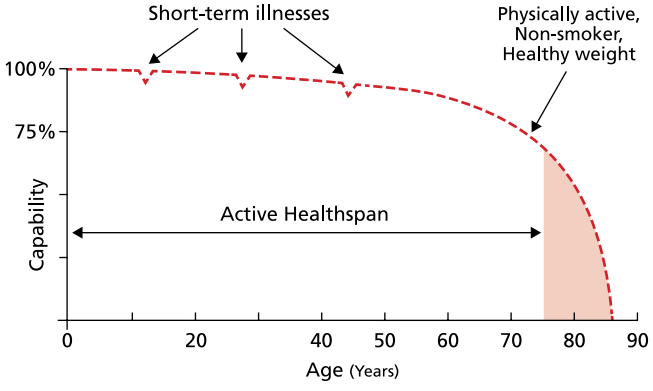
Unless you are extremely lucky, your body will have started to slow down by your 50s and 60s. But that is no reason to stop working out. A growing number of studies show that our psychological outlook and physical lifestyle continue to have enormous consequences in later life.

"We used to think that vigorous exercise would be dangerous for older adults, that they might suffer a heart attack, or fall or break bones," says Margie Lachman, director of the lifespan development lab at Brandeis University in Massachusetts. In the middle of the 1990s her team began following more than 3000 people aged between 32 and 84. Over the course of a decade, the participants general health was measured as well as three potentially protective factors: their physical activity, their social support and their sense of control over their life. In terms of overall health Lachman found that those in their 50s and 60s who scored well on those three factors looked much more like those who were in their 30s and 40s than people of their own age.

"Promoting group exercise or sharing one's exercise successes with friends and family can be a way to increase activity and social support, both of which are beneficial for health," says Lachman. And keep active. One study, for instance, found that a programme of strength training improved the mobility of people in their 90s. If you want to remain healthy then regular, challenging activity is essential into your 70s and beyond. "It is never too late to make some changes," says Lachman.[6]

Physical Activity influences our functional performance as we age.
(*ZOE podcast featuring Dr Claire Steves*).

"Physical activity, physical fitness, doing stuff using your body, even standing up more, and being less sedentary. That's a really big driver and it's not just a driver of physical health and bone health. It's also a driver of a healthy immune system, and it's also a driver of a healthy brain…This is quite recent science. There are studies which have shown really in the last 10 years that strong physical activity changes your immune system, makes it much more similar to younger people. A team had a look at the total body physiology and also the immune cells in the blood of people who did a lot of cycling very regularly. So they're very physically active, older adults, they saw that their blood cells and their immune cells were similar in performance to very much younger people and very different from most sedentary old rattles, they came up with this idea that maybe all the aging that we see around us is not necessarily because of aging, it's because of increasing physical inactivity, which then drives changes.



PHYSICAL ACTIVITY/EXERCISE CAN BE THE KEY TO A LONGER HEALTHY LIFESPAN' *[ADAPTED FROM THE BOOK 'EXERCISED', BY DANIEL LIEBERMAN, PAGES 246-7]*

Age-related muscle loss happens to everyone. Around the age of 30, we start to lose up to 5 per cent of our muscle mass each decade, and this accelerates at 70 …

I was looking at why some older adults, their cognitive function really changes very much, even though they don't necessarily have dementia, over 10 years we saw that the strongest driver was actually physical performance right back at the beginning, and that not only affected their cognitive performance on tests, but also you could see very clear differences in the brain structure and function of those individuals that performed more physical activity at the beginning than those that didn't." [7]

CHAPTER 4

Strength Training & High Intensity Interval Training (HIIT)

The benefits of Strength Training – *strength training could add years of life and protect you from some major killers. Skip it and you could be overlooking one of the best forms of exercise for the body and mind.*

Age-related muscle loss happens to everyone. Around the age of 30, we start to lose up to 5 per cent of our muscle mass each decade, and this accelerates at 70 …over time the kinds of fibres in our muscles change, with 'type two' fibres, which help us bear heavy loads for short spells, slowly being replaced with more 'type one' fibres that are more efficient over long periods but less able to carry weight…one study showed that lifting weights for less than an hour a week reduces the risk of heart attack and stroke by up to 70 per cent – independent of any aerobic training.

…one reason muscles keep us healthier is that they help prevent the debilitating effects of wobbles, falls and problems moving, increasing well-being in the process… while you don't have to look like a bodybuilder to reap the benefits of weight training, having bigger muscles is also linked with longer survival for people with cancer, probably because the disease decreases muscle mass, so it is helpful to have a bigger resource to start with to keep the body going for longer.

Muscle also plays an important role in regulating the body's glucose levels. With the help of insulin, it soaks up glucose from the blood and stores it in the form of glycogen. Bigger muscles mean a bigger sink for glucose and a higher number of cells that transport and clear glucose from the body, which all helps ward off type 2 diabetes, in which blood glucose levels become too high.

Another surprising benefit of strength training is how it burns calories, even after the exercise is over. Weight training increases the basal metabolic rate – the amount of energy the body consumes at rest – in two ways. First, bigger muscles require more energy to fuel their tissue maintenance. Second, in the short term, lifting weights causes tiny tears in your tissue that require a relatively large amount of energy to remodel. This increased energy demand can last for three days after a workout…All of this helps if you want to decrease body fat, a factor associated with lower cholesterol, lower blood sugar and improved insulin sensitivity and glucose control, which all contribute to a decreased risk of type 2 diabetes and cardiovascular disease. This is why getting stronger protects you from heart attacks.

But strength training really trumps aerobic exercise with its effect on bone. Our bones start to degrade as we age, losing mass and making us more prone to fractures. Aerobic exercise is beneficial to a lot of systems in the body but there is little evidence that it protects us from bone loss. Our bones are in a constant flux of being broken down by cells called osteoclasts and being built up again by osteoblasts. Strength training places stress on the bones…helping us maintain, and even build, denser bones. This significantly lowers the risk of osteoporosis, which causes…hip fractures.

.. building muscle can also boost your brain. Several studies show that people with a better grip strength – hence better overall body strength – score higher on tests of memory and reaction time, as well as on assessments of verbal and spatial abilities. This means that grip strength can be used as a marker of cognitive decline.[8]

However you do them, resistance activities are critical for maintaining muscle mass, especially fast-twitch fibres that generate strength and power. Resistance exercise can also help prevent bone loss, augment muscle's ability to use sugar, enhance some metabolic functions and improve cholesterol levels. As a result every major medical health organization recommends we supplement cardio with weights, especially as we age.

A consensus suggestion is two sessions per week of muscle-strengthening exercises involving all major muscle groups (legs, hips, back, core, shoulders and arms). Space these sessions several days apart to permit recovery, and they needn't involve large weights but should include eight to twelve repetitions of each exercise tiring enough to make you want to stop: two or three sets of exercises are more effective than just one.[9]

The Power of High Intensity Interval Training (HIIT)

The promise of getting super fit with very short bouts of exercise might sound like wishful thinking, but HIIT can be worth working up a sweat about.

"High-intensity training works, it's been shown pretty consistently to make you fitter, to make you healthier" says sports scientist Chris Easton at the University of the West of Scotland. That's because pushing the body out of its comfort zone for short bursts forces it to adapt. The higher the intensity, the greater the adaptation, with benefits for your lungs, heart and circulation…That's not all. One study compared muscle samples from younger and older people who had regularly done either HIIT training, a weights workout or both for three months. The researchers found that HIIT reduced and even sometimes reversed, the effects of old age on mitochondria, the energy powerhouses inside cells….

every major medical health organization recommends we supplement cardio with weights, especially as we age.

…full-on HIIT isn't for everyone, but incorporating some element of vigorous exercise in a longer routine -whether faster paced walking or jogging, some hills, burpees or just a few stairs- will deliver benefits. "In terms of disease risk, what is protective is substantially improved when there is a higher intensity component," says Easton.[10]

Note - **HIIT** *is vigorous cardio (aerobic) training, not strength training*

CHAPTER 5

Be warned! Why you can't outrun a bad diet

– forget the idea that to lose weight you just need to work off more calories than you consume… Exercising more ***doesn't*** *mean more weight loss.*

We are starting to discover just how much the body adapts and slows down calorie burning when you exercise above a certain level…The body might be responding by cutting down on other tasks. For example, immune systems quieten down, reducing inflammation, which is important because we know that inflammation is a serious risk factor for cardiovascular disease and a range of other health problems.

People who exercise regularly also respond to stressful events with smaller surges of the stress hormones cortisol and adrenaline, reducing their risk of stress-related disease. Even reproductive hormones seem to be produced more judiciously. Comparisons of oestrogen and progesterone in women and testosterone in men commonly show reduced levels among adults in physically active populations. These reductions don't appear to harm fertility, but they have been linked to a lower risk of reproductive cancers such as prostate and ovarian cancer, as well as breast cancer. Exercise seems to fine-tune all the unseen tasks our bodies do throughout the day, helping to protect us from heart disease, diabetes and cancer.

Ultimately, it is hard to avoid the conclusion that for many people diet offers greater potential than exercise to get the calorie equation working more in your favour. But exercise does still have an (***essential)*** place in the weight-loss journey: once you lose weight, it can help prevent the common problem of putting it back on… there is no need to somehow compensate through intense amounts of exercise to make up for indulgences. **Diet is key** though.[11]

CHAPTER 6

Mixing exercise types; choosing activities; setting goals

The mix of exercise types. Everyone benefits from mixing it up because weights, moderate intensity aerobic exercise and HIIT have different, complementary effects on the body…Exercise can foster vigor, vitality and fun, but the majority of us also exercise because we worry about our weight and conditions like heart disease, cancer, and Alzheimer's…

Typical aerobic exercises include fast walking, jogging, cycling,….If you are fit you can also sustain for lengthy periods of time more vigorous aerobic exercise, which is conventionally defined as 70 to 85 % of maximum heart rate.

Thousands of studies since 1968 have firmly established the many diverse elements of exercise… the most obvious benefits are cardiovascular, hence the term 'cardio'. Because the fundamental challenge of aerobic activity is to deliver more oxygen at a faster rate to muscles, this demand stimulates the chambers of the heart to grow stronger, more capacious and more elastic. These adaptations in turn increase the heart's cardiac output, the product of heart rate and the volume of blood pumped per contraction. In the blood, aerobic exercise augments the red blood cell count but also increases the volume of plasma, reducing viscosity so the heart can pump blood more easily. Sustained increased cardiac output also stimulates the expansion of the many small arteries and capillaries where oxygen exchange occurs in the muscles everywhere including the heart's muscle itself. And aerobic exercise raises so-called good cholesterol (HDL) and lowers so-called bad cholesterol (LDL) and circulating fats (triglycerides). Altogether, these many effects help keep hearts strong, arteries clear, supple, and unclogged; and resting blood pressure low…Weight-bearing aerobic activities (alas not swimming) stimulate bones to grow larger and denser when we are young

and repair themselves as we age, and they strengthen other connective tissues. In moderation, aerobic exercise stimulates the immune system…last but not least aerobic exercise increases blood flow to the brain and elevates the production of molecules that stimulate brain cell growth, maintenance and function, A good cardio workout really does improve cognition and mood.[12]

Everyone benefits from mixing it up because weights, moderate intensity aerobic exercise and HIIT have different, complementary effects on the body…

Choosing Activities

Find a sport or activity you enjoy, or do several different ones so you don't get bored. You may get more benefit from a mix of activities than just one. Do not try too much at first, build up gradually. You might find it more fun to exercise with other people. Ask a friend or your wife/partner to come with you, or join a sports team, a walking, cycling or running group.

Setting Goals

For your personal motivation try to build your programme for the mix of activity types (aerobic, strength, balance, etc), set achievable goals and measure your progress towards these against time. If you have a fitness tracker or sports watch you can count your steps and measure your heart rate (and probably other aspects as well). '10,000 steps a day' was a marketing feature for a device years ago but there is little evidence to support this, much less can be beneficial if it includes moderate or vigorous intensity exercise. Once you have achieved a certain level, reset your goals for the next higher level.

Try the free Strava GPS cycling and running app (download from Apple App Store or Google Play Store) to track your cycling and running, share photos and follow friends, etc.

You can set goals for your resistance training, i.e. number of repetitions and sets. You need to achieve muscle fatigue by the time you complete the number of repetitions. If you find it easy you need to increase the weight or change the resistance band, so as to overload the muscles and improve your strength. As muscles repair they become stronger.

Do not forget to have a rest day once or twice a week, to allow your body to recover. Rest is a vital part of your training programme. Also try and get 7-8 hours of sleep each night.

Pace of exercise

'Your heart rate is the number of times your heart beats per minute (bpm). A normal heart rate is between 60 and 100 bpm while you're resting. However, it will vary depending on when it's measured and what you were doing immediately before the reading

What is a target heart rate? Your target heart rate (THR) is between 50% and 70% of your maximum heart rate. You should aim to exercise with your heart rate between these two figures. Your target heart rate will make sure you increase your fitness and strength safely.

If you have a heart condition, check with your doctor before doing any new exercises, in case they aren't suitable. You should also warm up and cool down before and after exercising to avoid injury to your muscles and protect your heart from speeding up or slowing down too fast.

To find your target heart rate (THR) go to this link *https://bhf.org.uk/patientinfo/heart-rate-calculator/app/index.html*

Constant pace training involves keeping your heart rate within a small working zone, e.g. steady walking. It builds endurance and provides a base level of fitness.

Remember to warm up before you exercise and cool down with some stretches afterwards. Stretching is important as it helps your muscles relax and reduces muscle soreness and stiffness.

Drink plenty of water, as you must keep well-hydrated.

CHAPTER 7

Exercise Activities and Sports

Take a sensible and gradual approach to exercise, appropriate to your age, health and existing fitness level. For anything new, start gently and recognise that you are trying to make a beneficial lifestyle change that may take time to build up to moderate levels, and accept that trying to achieve 'vigorous' levels of exercise might be unsuitable if you are quite elderly, under treatment or have pre-existing health conditions. It would be prudent to first consult your GP practice before embarking on any unaccustomed exercise activities. When you do exercise, if you get chest pain or extreme shortness of breath, stop the exercise and consult your GP practice or dial 111.

The 'Green Gym'

The 'Green Gym'- what you can do in the great outdoors, it can be very enjoyable and beneficial, not just physically, but mentally too.

Walking/Hiking

Walking can be an enjoyable and beneficial exercise. Purposeful brisk walking, say at about 3 miles/hour, 30-minutes daily, is excellent. It can increase cardiovascular fitness and endurance. It is also a weight-

bearing exercise so can help to build bone strength and muscle in the lower-body. A simple guide for 3mph, is that you should be able to hold a conversation, but not sing the words to a song. Download the free NHS app 'Active 10' for walking onto your smartphone from Play Store (for Android) or the Apple Store.

Walking is a very popular, relatively safe and flexible outdoor activity which one can do alone, with friends or family or as part of an organised walking group. One can be adventurous and explore new places on foot. There are many local groups, there is also 'The Ramblers' charity which represents walkers' interests and organises free group walks around the country, see *www.ramblers.org.uk*

Technique for proper fitness walking - we know how to walk, or do we? Be aware that proper posture and other factors can help greatly In ensuring our safety and good performance when we walk, especially If we use walking as one of our main exercises. It starts from having a good heel-to-toe foot strike, first the heel, then the ball, then the toe. It can take a few weeks to get used to this style of walking as opposed to just placing one foot In front of the other. It might also make your legs and ankles ache a bit due to previously underused muscles, but coupled with other aspects of posture, stride, arms, etc., it can be well worth It. Joanna Hall, with Lucy Atkins, published a book In 2013 entitled 'Joanna Hall's WalkActive Programme'. Of course these days there are now videos and an App for It! Some aspects are free, some training is on subscription. See *https://walk-active.com/*

There is also a USA guidance from Maine. 'How to walk with Proper Form and Technique for Fitness' Search for this on the maine.gov website.

Nordic Walking

Nordic walking provides all the benefits of a brisk walk, but also exercises the upper body, thus helping to meet cancer rehabilitation recommendations for aerobic exercise and regaining muscle strength in arms, back and shoulders.

More calories can be burned when compared with many other activities. Like swimming, Nordic walking is a whole-body exercise – whereas cycling or running are lower-body dominant. Nordic walking combines aerobic (heart and lung) with resistance (muscle strengthening) exercise; put simply, more muscles are actively involved in Nordic walking movement, and the better the technique, the more calories you burn.

You do need to be properly trained though, by a registered instructor. You might think it is just like using two of the normal walking poles, but using the Nordic poles with their special glove-style straps is very different and the technique needs to be learnt to be effective and safe. Nordic poles are not expensive (from about £20 a pair for aluminium, more for carbon fibre), but if you take lessons or join a group they may supply poles. Once properly taught by a registered instructor you'll have learned an amazing 'green gym' exercise for life.

Nordic walking uses more major muscles than running, cycling or swimming, so it is a great option for cross-training. However, it doesn't involve the same constant pounding as running (without appropriate footwear), so you can reap the cardio and muscular endurance benefits by using poles, with less impact on your knees and other joints.

After training you will be qualified to Nordic walk on your own anywhere - pack your poles and you are off! More locally, however, there are a number of groups throughout our region, of mixed abilities and experience, who walk together on a regular basis. Refer to the websites at the end of the booklet.

Cycling

The majority of us have cycled sometime in our lives, and once learned it's a skill never forgotten. Dust off that old bike, give it an oil, check the brakes, and get pedalling! Cycling is a great aerobic exercise, burns calories, gets the heart working, and is very low impact on dodgy knees and joints. However, it does not have much upper-body benefit, so TRX suspension, exercise bands or similar should be used to complement cycling and give balance to your fitness regime.

There's so much useful equipment for cycling available nowadays in major outlets and online but, essentially, all you need to start with is a safe and comfortable bike, a helmet, and comfortable clothing to suit the conditions, not forgetting the sunblock on sunny days. Don't forget to take some water if you're trying more than a quick once-round-the-block, and don't overdo it on your first few rides. You could try a fitness tracker for information and target motivation.

Your saddle is your friend and should make the ride a pleasure. Don't use a hard, pointy saddle unless you are comfortable. There are so many different saddles available for leisure cycling use nowadays, including sprung, gel, a man's 'gangly-bits' hole, and droopy nose. Saddle adjustment is also very important, to look after what we have left down below, and you can refer to the links below for how to set it. Otherwise, just ask at your local bike shop - they will usually give helpful advice to suit your needs.

To find advice on the best height and angle for your saddle can be found on these two websites *www.roadcyclinguk.com* and *www.bikeradar.com*

Main road cycling is not to be encouraged unless there are dedicated cycle lanes. Try to find quiet roads or lanes. Better still, if your bike has suitable tyres, take it to off-road bridleways and tracks. Remember you can cycle on bridleways, but not on footpaths. Try not to push hard on the gears early on, just aim to keep up a good cadence (the rate your pedals turn) in an easy gear, this will build muscle strength and increase endurance.

Joining a local cycling club is Invaluable - you'll meet like minded people and it will give you confidence to extend your rides.

Before venturing out remember:

- Wear a helmet. For road use know the Highway Code, wear a bright yellow or orange tabard. Fit flashing lights. See and be seen!
- Wear suitable clothes for the conditions.
- Take water, basic bike tools and a puncture repair kit.
- Ensure the bike is serviced and roadworthy. Pump the tyres to pressure and check the bell works.
- Be vigilant and aware of your surroundings and other road users. Don't wear earphones.
- Don't ride the bike within 48 hours of a forthcoming PSA test!! (It can massage the prostate and so may cause your PSA reading to be unusually high).

The writer, Brian Holden's prostate cancer experience, following two separate courses of hormone treatment, HDR brachytherapy and two separate courses of radiotherapy, left him with severe leg muscle wastage. Unable to cycle up hills onto the South Downs Way, he decided to take the plunge and have a professional electric conversion of his own mountain bike. This conversion has been a lifesaver, as hills never attainable before are now cycled comfortably. The distance travelled has doubled, without doubling the effort. No more tiredness cycling into a headwind, especially on the way home after a long ride.

Don't ride the bike within 48 hours of a forthcoming PSA test!! (It can massage the prostate and so may cause your PSA reading to be unusually high).

Running

Running is a very flexible outdoor activity, as you can choose when or where to run, your distance and speed, and what terrain - from concrete pavements to country trails. You set your own goals, or just run for fun.

To the mature adult who wants to try running for fitness, please don't be put off by intensive marathon regimes, and there is no obligation to buy expensive Lycra kit! Good footwear is essential though - trainers that fit properly, have good cushioning and good grip (not hard plastic soles). Man-made fibre clothing is preferable to cotton, as it wicks perspiration and feels drier.

So how to start running?

We suggest you follow NHS guidelines, their website recommends the *couch-to-5k app,* this is a brilliant guide you can download to your smartphone, via Play Store or Apple Store. It is free and designed to take you from absolute zero to 'hero' in about 8 - 10 weeks. Suddenly, it makes running 5k (about 3 miles) achievable.

If you plan to run often and extensively then, if you can afford it, consider buying good quality technical running shoes from a specialist supplier, they are not cheap (around £80 upwards per pair), but it will be money well spent on protecting your feet and joints. Running on hard surfaces like concrete is harder on the body than softer surfaces, like off-road paths and grass.

Motivation can be an important factor, so a friend or family member joining you can be a big help. Sometimes you might not feel like running but with the sense of achievement afterwards, you're glad you did! After a run, do walk around for a few minutes to help avoid muscle stiffness in the legs and carry out stretches recommended on the above NHS website.

Choose a safe local route, whether just round the block or in the park. You might be lucky enough to have a seafront or country paths nearby. It's ok to alternate by running a few minutes, then walking, then running etc. After a few sessions you can build up the running distance. Push yourself a little, but stop if you feel dizzy or unwell. Don't run if you feel dehydrated, nor until around two hours after a meal. For a run of thirty minutes or so there's no need for any special sports diet.

See if there is a Saturday morning Park Run near you (www.parkrun.org.uk), these are regular free 5km (3 miles) events for runners of all ages and abilities. In some coastal parts of our region, they are not run in an actual park but along the seaside promenade, e.g. Worthing, Sussex.Compared with walking**,** running puts more force onto the bones, so if you think running is for you follow a training programme that gets progressively more intense. This can promote bone growth and strengthen the muscles that absorb more force, as well as associated ligaments and tendons. Rest days are important, your bones need a recovery period to create new cells and adapt to the loads experienced, otherwise stress fractures can occur.

As a regular aerobic activity, running will improve your levels of energy and vitality, body mass, self -confidence and general positivity. It is best to balance running with resistance training such as gym workouts, Yoga or Pilates.

To be fit enough to say "It's a nice day, I'll just pop out and do 3 miles" would be an achievement to be proud of. One day you might even run a 10k race for charity, such as PCaSO! Your body and metabolism would be proud of you.

The idea that running wears the body out is a myth. In fact it is quite the reverse. Running helps activate all kinds of repair and maintenance mechanisms

The idea that running wears the body out is a myth. It is quite the reverse Alister Hart, a surgeon at the Royal National Orthopaedic Hospital in London and his colleagues recruited 82 runners taking part in the London marathon, all of whom were over 40 and who had never run the distance before. Using MRI the runners' knees were scanned in detail six months before the race and again a few weeks after…Hart's take-home message is that distance running can have long term benefits for your knees *(using good quality cushioned shoes -Ed)***.** The team also did a study on hips, which found that 560 kilometres of a marathon training programme, ending in the race, didn't cause pre-arthritic changes in the hip joint.

In the US National Walkers' and National Runners' health studies, Paul Williams and Paul Thompson of the Lawrence Berkeley National Laboratory measured the health of about 16,000 walkers and 33,000 runners over six years. Williams looked at osteoarthritis, which is caused by the breakdown of bones or cartilage in joints. He found that doing more running or walking actually reduced the risk of osteoarthritis and the need for hip replacements. It did not seem to matter if the participants walked briskly or ran slowly.

"The idea that running wears the body out is a myth. In fact it is quite the reverse. Running helps activate all kinds of repair and maintenance mechanisms," says Lieberman.[13]

The Home Gym

Gardening

Gardening, whether at home or on an allotment, is a physical activity that can improve the flow of blood supply and aid mental wellbeing from being outdoors. It can also provide satisfaction and enjoyment as your work can bring colour and beauty into your garden and bring fresh, tasty organic fruit, vegetables and herbs into your kitchen.

Resistance band exercises

Resistance bands are so beneficial and easy to work with that everyone should use them. Resistance exercises such

as with bands are particularly good if you are on hormone therapy and are at risk of bone thinning, as well as muscle loss. The bands are 2-metre lengths of latex, or tubes, that work like elastic bands, for a range of simple repetition exercises. The bands are usually available from sports shops or online and colour-coded for different strengths of resistance. A basic set of 3 bands, being low, moderate or high resistance, is all that is needed. They can be used in or out of doors, or taken on holiday, and used standing or seated. Many of the bands now come with detachable hand grips and with additional equipment for strengthening forearms, fingers and hands (see Grip Strength, on pg 32).

Exercises are available for upper and lower body strength, or core fitness. For individuals who run, walk or cycle, resistance bands can be complementary, by providing the upper body work-out that the other forms of exercise might lack.

Regular use of resistance bands for upper body, say for 15 minutes each day, can soon tone and strengthen a range of muscles in the arms, shoulders, neck, back and, importantly, the abdomen. This improves posture and provides a sense of greater general health.

A sample set of 'starter' upper-body exercises could be:

1. Stand holding one end in each hand with the band's centre under your feet. Pull upwards so your hands are level with your eyes. Repeat 10 times.
2. Loop the band's centre around a stout door handle, hold the ends at waist level, stand back so the band is in tension, then pull as if skiing. 10 times.
3. Turn round and repeat (2) but as if skiing uphill backwards. 10 times.
4. Face the door holding the band in tension at chest height. Pull as if rowing. 10 times.
5. Turn round and repeat (4) as if rowing backwards. 10 times.

This writer has built up to 60 or more repeats of each type daily. A wide range of suggested exercises is available online, such as on the British Heart Foundation website *www.bhf.org.uk* As with all exercises it may seem difficult at first so don't over-exert yourself. - but to be effective the exercise should increase the heart rate and breathing. You should soon see benefits, and increase the number of repetitions (reps). There are no 'rules', you could vary the number of repeats or add further elements for core or lower body strength.

Resistance training – suspension systems (e.g. TRX)

TRX is one brand name, but there are various others. In simple terms, TRX suspension training is a system comprising strong webbing straps which can be attached to a suitable fixed hook on the wall or, much more simply for the home user, can be safely slid down the gap between a suitable door and its frame, used for exercising, and then easily removed after the session. It uses gravity and your body weight to allow you to do different workouts.

You're in control of how much you want to challenge yourself on each exercise, because you are able to adjust your body position to add or decrease resistance. It is ideal when you are undertaking rehabilitation from treatment, or when preparing for it.

To start off choose a few different exercises that suit your specific fitness level and needs, do 10 repetitions of each. Remember 10 minutes of regular activity is much better than nothing at all.

TRX suspension training:

- Delivers a fast and effective total-body workout
- Helps build your core muscle groups
- Increases your muscular endurance
- Is suitable for all levels of ability

Other 'Home' activities

There are many other exercises one can do at home, either without equipment e.g. press-ups, crunches, squats or lunges or with simple inexpensive equipment, e.g. using small weights.

Grip Strength involves both hand and forearm muscles, and is an important area to work on as it tends to get weaker with age. There are inexpensive hand exercisers and massage balls to help strengthen one's grip. Weight training is also useful.

Leisure activities and Sports

Leisure centres

Leisure centres are vibrant and motivating health and exercise facilities, often run by local authorities. They are not just Lycra and muscle-building environments and, particularly at off-peak times, you will be with many others of your own age and fitness level.

If you are a cancer patient, you could see your GP and ask for a referral to a local centre. Dependent on what is applicable in your locality, a GP referral might result in a reduced membership fee, and the major benefit of having a dedicated team of experts who will give you the right instructions on how to use the equipment to aid your pre-treatment, or recovery from cancer treatment. You may have an induction session, be reviewed midway and at the end of the course, after which you might be offered a long-term reduced-rate fee to carry on the good work.

Various facilities may be available to you, including:

- Gym – full, personalised instructions for your course will always be given
- Instructed rehabilitation therapy classes in the pool
- Swimming, and possibly a health suite with steam room, sauna, jacuzzi

- Squash courts, Tennis courts, Badminton
- A variety of classes including specialised referral classes, yoga, Pilates, stretching, weights, etc
- Walking football, and lots more, depending on your local centre facilities.

It might sound exhausting, but you'll be surprised how quickly your fitness improves, and how many other people are also rehabilitating from surgery or illness alongside you!

Swimming

Regular swimming is a great fitness activity that exercises a wide range of muscles, some of which would not otherwise enjoy a workout! There is certainly no age barrier to learning to swim, or returning after many years away. If there is a pool near you, there will probably be lessons for all abilities, and aqua-aerobics or aqua-fit sessions also. Lessons would help to build confidence in the water, if needed.

Swimming builds cardiovascular strength and improves all the major muscles, not least because water provides around 10 times as much resistance as air - yet without causing undue stress to bones and joints. If you have trouble with walking or running then swimming might be a good alternative for you. There would be a slight trade-off in not contributing to bone density strengthening, but you can complement swimming with resistance bands exercises at home, see earlier.

Aqua aerobics is an increasingly popular fitness activity for retired people, and even non-swimmers can safely take part in these organised sessions. Aqua fitness is a little more advanced, where participants use weights or resistance bands in the water, and even engage in 'aqua jogging'.

Regular exercise is key, and swimming could be used as one of a number of exercise types - in fact up to triathlon standard, for the very fit! Swimming would certainly be an enjoyable, varied and satisfying contribution to your exercise portfolio.

Walking Football

Walking football is aimed at keeping people aged over 50 involved with football if, due to a lack of mobility or for other reason, they are not able to play the traditional game. The sport can be played both indoors and outdoors. Walking football is a unique sport, different to regular Association Football in many ways. Tournaments are now catering exclusively for not only over 50s, but the over 60's and over 70's age groups.

There are 52 rules listed on the Walking Football Association's website, see *https://thewfa.co.uk/*, but the one rule that everyone is agreed on, is that one foot must

remain on the ground at all times. "If it looks like running," notes the WFA, "it probably is". Nevertheless, the rule is frequently broken when players get excited and break into a light jog, the penalty for which is a free kick to the other team. Other key rules are - no physical contact between players, over-head height restrictions and indirect free kicks ensure that the sport is played safely with full consideration to the participants' age. Teams are either 5 or 6-a-side, dependent on the size of pitch being used.

As a result of these rules, games are played at a slower pace, often on state-of-the-art third generation (3g) artificial grass pitches (which include some rubber), thus reducing the threat of pain, discomfort and injury, with players briskly walking through matches, maintaining contact with the ground at all times. This allows people who have loved football all their lives to once again safely get back to playing and also introduces the sport to people who perhaps have never considered playing before.

There are now over 1,100 walking football clubs in the UK and 170 teams entered the three age-group categories of the WFA National Cup.

One of the major benefits of taking part in walking football, whatever your ability, is the exercise it provides, played on a regular basis it is surprising how much fitter you can become. While playing a match, which can last anything from 10 minutes to half an hour, you are constantly moving and turning in different directions and this does acardiovascular exercise regimes with a competitive edge.

Golf

Golf is a popular outdoor sport that can be played by anyone whatever their age. It can be competitive but can also just be played as a friendly social activity without serious attention to the score. It can be frustrating when you do not do well but challenges you to play regularly, to practice and do better next time! Golf courses are either 9 or 18 holes and most are very picturesque green spaces. Being close to nature golf can be good for mental as well as physical wellbeing and can relieve stresses of everyday life. Provided you do not drive around in an electric buggy golf can be a good workout that may support general and heart health. Playing a full 18 holes with a golf trolley can be quite a walk, especially if the course is undulating. If you have not played before enquire at your local golf club. It is advisable to have lessons, at least when you start. Some golf courses do not need you to be a member, you just pay for a round. However, golf club membership can mean making new friends, playing whenever you like and can include off-course social activities. Some clubs hold 'Golf Days', raising money for charity, including cancer charities.

Pilates

Pilates is increasingly popular but probably little understood by those who don't already practice this mind and body exercise programme. Pilates will develop a range of posture muscles for a healthy back and, importantly for prostate cancer patients, strong abdominal muscles.

The exercises can be tailored to different levels and needs, with new challenges built in with experience. By working to balance both sides of the body, areas of weakness are identified, and those muscles will become stronger with progress. Each Pilates session should result in a sense of being refreshed and invigorated. The exercises are easily built into daily life, and can be complementary to other aerobic activities such as walking, running or cycling.

Pilates can be suitable for all ages and abilities. Look for a beginners' class if you haven't tried Pilates before, and let the instructor know about your condition and any injuries or weak areas. They'll be happy to tailor the stretches to suit your ability. As is always recommended, those with pre-existing health conditions may need to check with their GP before taking up any new or increased form of exercise.

Demonstration videos can be seen on YouTube, and a quick internet search will identify Pilates groups in your area

Yoga

Yoga is not just for women; many men attend the same classes. Although men are usually less flexible, the benefits are equally as good. Yoga, as exercise, is a physical activity consisting mainly of postures, flowing

sequences, and breathing exercises, ending with relaxation lying down. Yoga helps to relieve fatigue, build muscle strength and core stability. Flexibility and stamina improve, and it helps sleep quality. The overall purpose of yoga is to connect body and mind so as to engender peace, power and clarity.

To learn correct technique and postures it is best to attend local classes, before doing some postures at home. Classes are held in some Macmillan Cancer Support centres, some hospital rehabilitation facilities, leisure centres, church halls, schools and dedicated yoga centres.

A good instructor is essential, and an excellent source for finding one, and much more detailed information on yoga, can be found at the British Wheel of Yoga, *https://www.bwy.org.uk/*

All you need to wear are light loose clothes, suitable footwear, socks or bare feet and, once keen, your own soft yoga mat.

There is a special type of yoga called hot yoga, which is carried out in rooms at a temperature of 30° – 50°. Hot yoga has similar benefits to other forms of yoga, but they are further enhanced by the heat. The writer spent three years attending these classes, and would recommend that those who are able to enjoy heat give it a try.

Tai Chi and Qi Gong

This is an area of exercise that you may well have heard of, but never tried; Tai Chi (pronounced tie-chee) and it's associated companion, Qi-gong (chee-gong).

Tai Chi is a form of exercise that began as a Chinese tradition. It's based in martial arts and involves slow movements and deep breaths, it's a great way of complementing any exercise regime. As a simple explanation - if you held a wet towel in your hand - how would you best squeeze out excess water ? … well, as you'll know; 'wringing' it is far better than simply squeezing … and this is the basis of how Tai Chi tones and strengthens muscles, tissues, fibres and ultimately deep into the cells of your body and your essential Lymphatic System.

There are numerous studies claiming Tai Chi can improve both your balance, physical and mental health. This safe and gentle form of exercise is appropriate for all ages and fitness levels. Research by the University of Bournemouth (the Tacit Trial 2019) found that Tai Chi brings positive health benefits to older people with Dementia.

Tai Chi, meaning 'great energy', has its origins over 5000 years ago in China and was originally the foundation of martial arts (Kung Fu, etc). Tai Chi is now the main exercise of 80% of retirees in China. In addition to gently 'massaging' your whole internal body structure, it is fantastic for maintaining flexibility, balance and keeping all your joints 'well-oiled' too. You can do it standing or sitting down, there is no grade to attain (although there are proficiency levels to aspire to) and you can practise it even in a small room. Once you 'attune' to it, you will feel the holistic benefits too, improving and heightening ALL your senses. You become aware of one's breath entering deep into your body, the birds singing, the waves crashing on the foreshore, the heat of the sun on your body and so much more!

Qi Gong, meaning 'inner energy', Chinese in origin too and even more ancient. Softer than Tai Chi, it incorporates a more meditative approach. It can be practiced on its own, or more often in conjunction with Tai Chi.

"When I attended the Royal Marsden for my 37 daily Radiotherapy sessions - I always practiced Tai Chi for half an hour before each treatment and fortunately was one of the lucky ones with absolute minimal side-effects from radiotherapy!

For beginners' keen to learn more, YouTube has many 'exploratory/beginner' videos, but to really "feel" Tai Chi an experienced Teacher really is a must. There will be places locally where you can attend, the classes are inexpensive and no special clothing or equipment is needed.

Two recommended books,
"Tai Chi for Dummies",
"Tai Chi - Health for Life" by Bruce Frantzis.

I've been practising for over 9 years now and it is still a joy to embrace it." (***Mark Giddings***)

Dancing

Last but not least, there are the many forms of dancing. Whereas a slow waltz could be light exercise, many other recreational ballroom dances would fall into the category of beneficial moderate or even vigorous aerobic activity, such as the Quickstep, the Jive or Cha-cha-cha. Salsa dancing can be vigorous. Dancing can provide excellent aerobic exercise and also contribute to improving balance, posture and flexibility. It can be a full-body workout. Dance at home or join a dance class, or a fitness dance class such as Zumba.

CHAPTER 8

(Prostate) Cancer and Exercise

The Prostate Cancer Foundation (a prominent USA organisation) in February 2024 highlighted a Swedish study, (published in the British Journal of Sports Medicine, and reported in NBC news), briefly as follows:

"A recent study of nearly 58,000 men has found that improvement in fitness level is linked to a decreased risk of prostate cancer diagnosis. The men did not have prostate cancer at the beginning of the study, and were followed for an average of nearly 7 years. Men whose fitness improved during the study interval had a 35% lower risk of developing prostate cancer vs. men whose fitness declined. It's evidence, in other words, that no matter what age, no matter where you are in your life or your relative fitness, that if you improve your fitness, even by a relatively small amount, you may significantly decrease your risk of developing prostate cancer," said Dr. William Oh, the chief medical officer of the Prostate Cancer Foundation, who wasn't involved in the research.

What if you already have prostate cancer? Exercise is also beneficial: it can help lower your risk of recurrence or death from prostate cancer.

Many trials evaluating exercise programmes have concluded that moderate activity can reduce fatigue, improve mood, psychological well-being and benefit body composition. Other trials have linked exercise, especially if combined with other lifestyle changes, with a reduced rate of PSA (Prostate Specific Antigen) progression in men on Active Surveillance, and a reduced risk of relapse after radical treatments.

Studies have shown that faster-paced walking or vigorous exercise significantly reduced the risk of prostate cancer recurrence or prostate cancer death, compared with less intense or slower-paced exercise.

Being fitter is beneficial for men before treatment, as well as for 'survivors' of prostate cancer. The fitter you are before treatment the better the recovery time/ outcome, especially for chemotherapy or surgery, but also other treatments such as brachytherapy, radiotherapy or hormone therapy. A fit healthy body and immune system can help overcome any trauma to the body caused by cancer treatment.

Do Patients with Prostate Cancer Benefit from Exercise Interventions?

A Systematic Review and Meta-Analysis

(Jan 2022 (Denmark)

> The review identified 33 randomised controlled trials (2567 participants) eligible for inclusion… A positive significant effect was seen in lower body strength, whole-body fat mass, general mental health, and blood pressure… exercise is effective in improving metabolic health in men diagnosed with prostate cancer, with aerobic exercise as the superior modality… These findings indicate that using exercise complementarily to prostate cancer treatment may mitigate the development of metabolic disease."

If you need more detail see:
https://www.mdpi.com/1660-4601/19/2/972

Choose activities and activity levels you can manage safely. Individuals with pre-existing health issues or injuries should check with their GP before starting any new exercise. If you are on hormone therapy or have cancer that has spread to your bones, check with your doctor before doing high impact exercises such as running or contact sports, as you are more likely to break a bone if you fall. If you cannot do some activities or sports because of your prostate cancer treatments, side effects or other health conditions you might be able to do another one instead, e.g. swimming, cycling or just faster-paced walking.

If you have recently had surgery to remove your prostate take the advice of your doctor as to when and what activities you can safely do. Any exercise following surgery should be light and gentle so that your body can heal properly. You will probably be advised by your doctor to avoid any heavy physical activity for several weeks.

On page 48 of their Wellness Guide, The Prostate Cancer Foundation caution:

'Although decreasing body fat is beneficial for most long-term cancer outcomes, it is almost never ok to diet or exercise for weight loss during cancer treatment, and certainly without physician approval. Your focus should be on eating enough calories, and the proper type of calories in order to minimize the side effects of treatment'.

A fit healthy body and immune system can help overcome any trauma to the body caused by cancer treatment.

Stretching and co-ordination exercises are themselves important to maintain balance and avoid falls, which is particularly important for some patients on prostate cancer treatments.

After prostate cancer treatment you could ask your GP for a referral to a local municipal gym for a 12-week supervised programme, see Leisure Centres in Chapter 7. There are also charities such as Macmillan Cancer Support who can assist your rehabilitation after prostate cancer treatment. Cancer survivors in West Sussex are highly fortunate in having the UK's first 'Anti-Cancer' exercise Gym. This local charity, Cancer United, with its CU Fitter gym see https://www.cancerunited.org.uk/cufitter organises

Tips to stay safe and injury free while being active:

- Engage in short, light sessions at first to get your body used to exercise.
- Choose activities that match your fitness level. Gradually build up the time and intensity of these activities as your body adjusts. As your fitness continues to increase, try activities that require more effort.
- Try non-weight bearing, low-impact, aerobic activities such as swimming, biking, or rowing if you have muscle or joint problems or injuries that prohibit you from walking, running, or jogging.
- Be sure to maintain good posture and form throughout all exercises.
- For resistance exercise, separate sessions by at least 24 hours to allow your muscles time to fully recover.
- Choose a safe place for exercise with good lighting, ventilation and space to move about. Exercise with a friend when possible.
- Wear sunscreen and a hat when exercising outdoors during the day. At night, wear reflective clothing and bring a flashlight or other light (such as a bike light) so cars and bicyclists can see you.
- Always wear a helmet when cycling.
- Adjust your plan based on the weather: if it is cold, wear layers of clothing, a hat, and gloves. If it is hot, try to exercise in the morning or evening, reduce the intensity of exercise and take frequent breaks as necessary. Wear a hat and appropriate cool clothing. Always apply sunscreen.
- Drink plenty of water before, during, and after exercise.
- Wear comfortable and supportive shoes that are safe and appropriate for your activity.
- Above all, listen to your body. While exercise involves exertion and will feel challenging, you should never feel acute pain or overwhelming tiredness. [14]

If you are concerned or have a question about safety, please contact your doctor

activities and sports specifically for cancer patients' rehabilitation. A number of PCaSO members have already participated in these. Each course is overseen by fitness trainers who have also undergone extensive training on beneficial cancer treatment. There are specific training sessions for those with prostate cancer and you gain a sense of community sharing your exercise sessions with others 'in the same boat'.

What pace of exercise you might choose depends very much on your personal situation, your present health and fitness, your prostate cancer treatment and its side effects. Take advice from your GP/consultant as necessary and speak to other survivors and sports coaches as applicable.

In the fight against prostate cancer, exercise is the gift that keeps on giving.

… The research team of June Chan, Sc.D., at UCSF has shown in multiple studies that exercise can help delay or prevent prostate cancer progression. "Aerobic exercise after prostate cancer diagnosis may reduce the risk of prostate cancer recurrence or death by up to 60 percent." Chan's earlier studies in this field, funded by PCF more than a decade ago, showed a benefit to an hour of jogging six days a week – the level of exercise most of us can't or don't want to sustain… In more recent studies, she and colleagues have been looking at more doable levels of exercise – walking 30 minutes a day, or three or more hours a week, at a brisk pace (3 mph or faster). The brisk pace is important: One study found that men who walked three or more hours a week at a brisk pace after diagnosis had a 57 percent lower risk of having prostate cancer recur than men who walked at a slower pace, for less than three hours a week. Note: the key here is giving the cardiovascular system a good workout, not necessarily the act of walking itself… if walking that much is not a good option for you, swimming and riding an exercise bike – whatever you are able to do – are good, too. Studies by Chan and others have provided so much proof of the benefit of aerobic activity, in fact, that "we're actually at the stage now that the most recent Physical Activity Guidelines put out by the American College of Sports Medicine specifically note that exercise is recommended for men with prostate cancer to avoid the risk of dying from prostate cancer. We're really excited that we got to contribute to that work."

We all lose muscle mass as we get older. Strength training (lifting weights or using resistance bands, and doing muscle-building exercises) fights this loss. Strength training can be especially helpful in men on androgen deprivation therapy (ADT) for advanced prostate cancer, who are at higher risk of loss of muscle mass, osteoporosis, and also of weight gain, metabolic syndrome, and diabetes.

Note: If you have advanced prostate cancer, check with your doctor to make sure strength training is safe, and also for some guidance about the weights you should be lifting. [15]

Exercise your pelvic floor muscles

Pelvic Floor Exercises help reduce urinary symptoms in men, to firstly strengthen the pelvic floor muscles in advance of prostate cancer surgery or radiotherapy, and also after recovery from treatment.

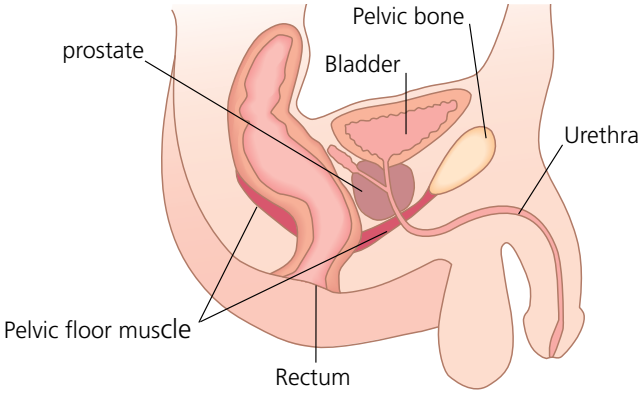
Below is a typical guide of what to expect, however, your Doctor, Oncologist or Cancer Nurse Specialist (CNS) should guide you on the specific regime of the exercises they wish you to do.

- Either sit upright with your feet touching the floor, or lie down - legs slightly apart
- Tighten and pull up the muscle around your anus (back passage) Imagine that you are trying to stop from passing wind, or to stop your flow of urine mid-stream.

If you are not used to doing them, gradually build up.

Slow exercises, to build stamina:

- Slowly tighten your pelvic floor muscles, hold tight for as long as you can, (up to 10 seconds).
- Rest for four seconds then repeat the slow exercise (up to 10 times)



Fast exercises, to build quick reactions, e.g. to coughs and sneezes

- Tighten your pelvic floor muscles as quickly as you can, hold tight for one second before relaxing.
- Repeat the fast exercise up to 10 times.

Repeat both slow and fast exercises three times per day for several months, to enable your pelvic floor to get stronger so your muscles will be able to work harder for longer. You should still do them once or twice daily, thereafter.

Alternatively you may wish to use the instructions for Pelvic Floor Exercises at the start of a booklet published by The Royal Marsden NHS Foundation Trust, Physiotherapy Department, (revised Nov. 2022) downloadable as a pdf, called 'Keep active: a guide to exercises for men with prostate cancer following surgery', follow this link *https://www.royalmarsden.nhs.uk,* then click on the "Patients and Visitors" menu and then Patient Information Library. there you can search for Pelvic Floor Exercises.

(The Royal Marsden booklet also covers sexual function / penile rehabilitation and keeping active after surgery).

Physical Activity and Exercise – Key Points

Key Benefits

Physical Activity and Exercise can:

- Reduce stress and promote our mental wellbeing
- Strengthen the heart and muscles, stimulate blood flow and help to repair blood vessels and keep them elastic, which may reduce the risk of heart attack and stroke
- Help keep blood pressure at healthier levels
- Help reduce blood glucose (sugar) levels, and may potentially reverse type 2 diabetes and prevent cancer
- Trigger helpful suppressive effects all over the body, helping reduce chronic inflammation and stress which increase risk for heart disease, cancer and diabetes
- Help the lymph fluid flow in the lymphatic system around internal cells and organs, removing toxic cellular waste
- Increase blood flow to the brain and generate new brain cells
- When walking, running or cycling, challenge the brain to co-ordinate our balance, navigation and movement, helping to maintain our cognitive reserve
- Improve fitness which may reduce the risk of developing prostate cancer and prevent or delay prostate cancer progression

Key Actions

- Sit less and keep physically active e.g. do work in house or garden, dancing or golf
- Choose a mix of sports or exercise types which you can enjoy. Consider joining a club or group that will encourage and motivate you. Set yourself targets to achieve
- Exercise aerobically, e.g. by walking, running, cycling, or swimming at least 30 mins a day, 5 days a week
- Counteract muscle loss as we age, by strength training for upper and lower body and core muscles, on 2 or 3 days a week
- Do activities or exercises that help joint mobility, flexibility, balance and co-ordination, e.g., yoga, pilates, tai chi
- Have a light-activity rest day once a week to allow your body to repair
- Eat and drink healthily to complement your physical activity and exercise, to provide the vital nutrients your body will need. Remember "you can't outrun a bad diet"

Note: *if you have pre-existing conditions, or had recent surgery, check with your doctor before commencing vigorous exercise.*

SECTION 3

Healthy Eating

What, how, and when we eat and drink, and how much, can either help or hinder our bodies, and our minds, to resist cancer and it's effects.

Eating and drinking more healthily are a major part of a healthy lifestyle, as are maintaining a healthy weight, reducing stress, sleeping well, keeping physically active and taking regular exercise.

We hope this Healthy Eating guide will make you think about what you usually eat and drink and what you might change, so enabling your good health, vitality and robustness. The habits and benefits of healthy eating and drinking can last a lifetime. Energy balance, low stress and food choices that increase protective nutrients are key to this.

We have not addressed environmental implications or animal welfare aspects, as although they are important, the topic of healthy eating for personal health is complex enough. They may however influence your personal choices.

CHAPTER 1

Nutrition – understanding the benefits

The incredible hidden benefits of good nutrition

We each are made up of trillions of tiny microscopic cells, each with a specific role to play in our very complex bodies which have evolved over millions of years. Inside and between these cells there is a lot going on within us ('like tiny factories'). It all needs to be provided with vital nutrients, for energy and the vast number of biological / chemical actions going on, day and night.

Without prebiotics our own bacteria, or any we consume in probiotic foods, cannot thrive.

The foods we eat and the liquids we drink provide the energy and nutrition we need. ('We are what we eat'). The scientific understanding of all this is still developing and will continue to do so. It is only in the last 20 years or so that knowledge of the gut microbes role became significant.

If our bodies do not get the right nutrition we each risk suffering the consequences in the medium/longer term, maybe even in the short term. The knowledge exists now, we just need to make an effort to understand and apply this for the benefit of ourselves and our families.

Good nutrition is one of the cornerstones of healthy living, that can make us feel at our best.

Nourish the gut microbiome with prebiotics and probiotics

As already referred to in Section 1 a critical element of digestion are the microbes in the gut (also known as the 'gut microbiome') that help break down food so it can be more easily absorbed by the intestines. The gut can contain both 'good' and 'bad' bacteria, each person will have their own unique set. The simplest way to support good bacteria is by regular consumption of plain natural **pro-biotic** ('live') yoghurts or kefir yoghurts, whether dairy-based or dairy-free.

Fermented foods [*where yeast and bacteria break down whole food components, such as sugars, into fermented foods, containing probiotics and prebiotics, e.g. sauerkraut and kimchi, beneficial for health and the gut*] can also be very important for improving gut health, but be careful to avoid fermented foods with a high salt content.

Prebiotics are foods these bacteria love to thrive upon - garlic is especially good in this regard. Without prebiotics our own bacteria, or any we consume in probiotic foods, cannot thrive. Many of the dietary fibre sources listed (see page 46) contain prebiotics too.

On page 198 of the book 'Genius Gut' by Dr Emily Leeming, the 'top prebiotic containing foods' are listed as: Chicory root, Jerusalem artichoke, Garlic, Leeks, Onions, Beans, Asparagus.

It is too easy to repeatedly shop for and eat similar foods each week. Experiment and try some variety, it can be better for our digestive system to have a broad range of foods for our good bacteria, and it can provide a wider range of nutrients for our bodies. Eat a 'rainbow' of brightly-coloured vegetables, the diversity of colours can mean different nutrients. Aim to eat at least 30 different plant foods each week to help achieve a diverse range of good bacteria in the gut, it is easier than it sounds! If you find it too great a challenge just start low and add a few more each week.

Eating and drinking healthily

To eat healthily we need to avoid, or at least minimise, the foods (and drinks) that are low in protective nutrients or contain high amounts of nutrients that can be problematic in excess. We should hydrate with water and healthy liquids, and eat the foods that provide the nutrients our body (and brain) needs to survive and contribute to our vitality.

A well-balanced nutritious diet should provide us with all the energy needed to keep active and provide the nutrients to stay alive, and to be strong and healthy. There is no reason to stop enjoying our food, provided it has beneficial nutrients and we do not eat too much.

All food contains nutrients in the form of macronutrients and micronutrients. Macronutrients are protein, fats, and carbohydrates, micronutrients include the vitamins and minerals within our foods.

Avoiding nutrient deficiencies is key to helping us stay free of disease (seventy per cent of the immune system resides in our gut, so by improving our diets and gut health we can help our immune system). Nutrient deficiencies may increase the risk of cancer, type 2 diabetes and heart disease.

On packaged foods, etc you may see mention of Reference Intakes (RIs). These are the average daily intakes of particular nutrients that should meet the requirements of 97-98% of healthy adults. These might help guide your food choices and amounts.

How Stress can undermine healthy eating

'Anticancer Living begins where stress ends. The presence of stress undermines our good intentions and efforts to eat properly, rest well, exercise adequately or make other health-enhancing changes. Not only does stress inhibit

our ability to do the right thing, it tends to trigger us to do the opposite, such as drink too much or smoke… If you come home from work stressed and exhausted, you are less inclined to spend the time chopping vegetables. Stress puts you in the position to say I'm not going to exercise today, or let's go out for a pizza.' [1]

Take care to avoid stressing yourself when adopting healthy eating habits, if short on time, energy or budget. Focusing on the "big picture", i.e. what you're eating most of the time, may help you be more relaxed about foods you want to eat every now and then. Also focusing on beneficial foods you can add in, may be a more positive approach than worrying about things you need to subtract.

Hormonal balance - our bodies contain hormones that regulate our health. If we are stressed, sedentary, or have unhealthy eating or drinking habits, these can disrupt the hormonal balances within our bodies. Prostate cancer is one of the 'hormonally-driven cancers', alongside breast and ovarian cancer. Poor eating and drinking choices can encourage cancer development.

CHAPTER 2

Dietary patterns

We can be markedly different from each other in how our bodies and digestive systems respond to particular food and nutrients, so we have to experiment to find out what works best for each of us. Any unhealthy habits can be difficult to kick, but even small changes to eating patterns can be beneficial and add-up over time. Most of us will still need the occasional 'treat', which will only be unhealthy if we do it too often!

It is best to eat whole foods [in their natural state, such as from farms, garden or allotment], or minimally processed foods [where a simple process such as milling or grinding has still retained most of the nutrients in the food]. Whole food is higher in nutrient density and fibre than highly processed food. Preferably these whole foods should be fresh and locally sourced (and organic), as transport time can reduce freshness and nutrient value. Some whole foods can still be quite nutritious if you buy them frozen,

WHAT NUTRIENTS DO FOR US

When we consume food the nutrients help us to stay alive, by enabling us to use them as an energy source, to heal, build and repair tissue. They also help to sustain growth, transport oxygen to our cells and regulate bodily functions.

ENERGY PRODUCTION

Macronutrients like carbohydrates, proteins and fats, provide the energy needed for daily activities, metabolic processes and overall vitality.

CELLULAR FUNCTION

Nutrients are essential for the proper functioning of cells, including cellular communication.

DIGESTION

Nutrients are needed for the digestive system, including the breakdown of food and absorption of nutrients from the gastrointestinal tract.

BRAIN FUNCTION

Nutrients are critical for proper brain function, memory and cognitive processes. Essential fatty acids, vitamins and minerals, such as omega-3, fatty acids and B vitamins, are important for brain health.

HEALTHY TISSUES AND ORGANS

Nutrients support the health of various tissues and organs, including the skin, eyes, bones and organs like the heart and liver.

BONE HEALTH

Nutrients like calcium, vitamin D and vitamin K are crucial for maintaining strong healthy bones.

HORMONE PRODUCTION

Vitamins and minerals are involved in the production and regulation of hormones that control various bodily functions.

IMMUNE FUNCTION

Vitamins and minerals are important for a strong immune system. They help the body fight off infections and diseases.

REPAIR AND MAINTENANCE

Nutrients are required for the repair and maintenance of tissues, especially during times of injury and illness.

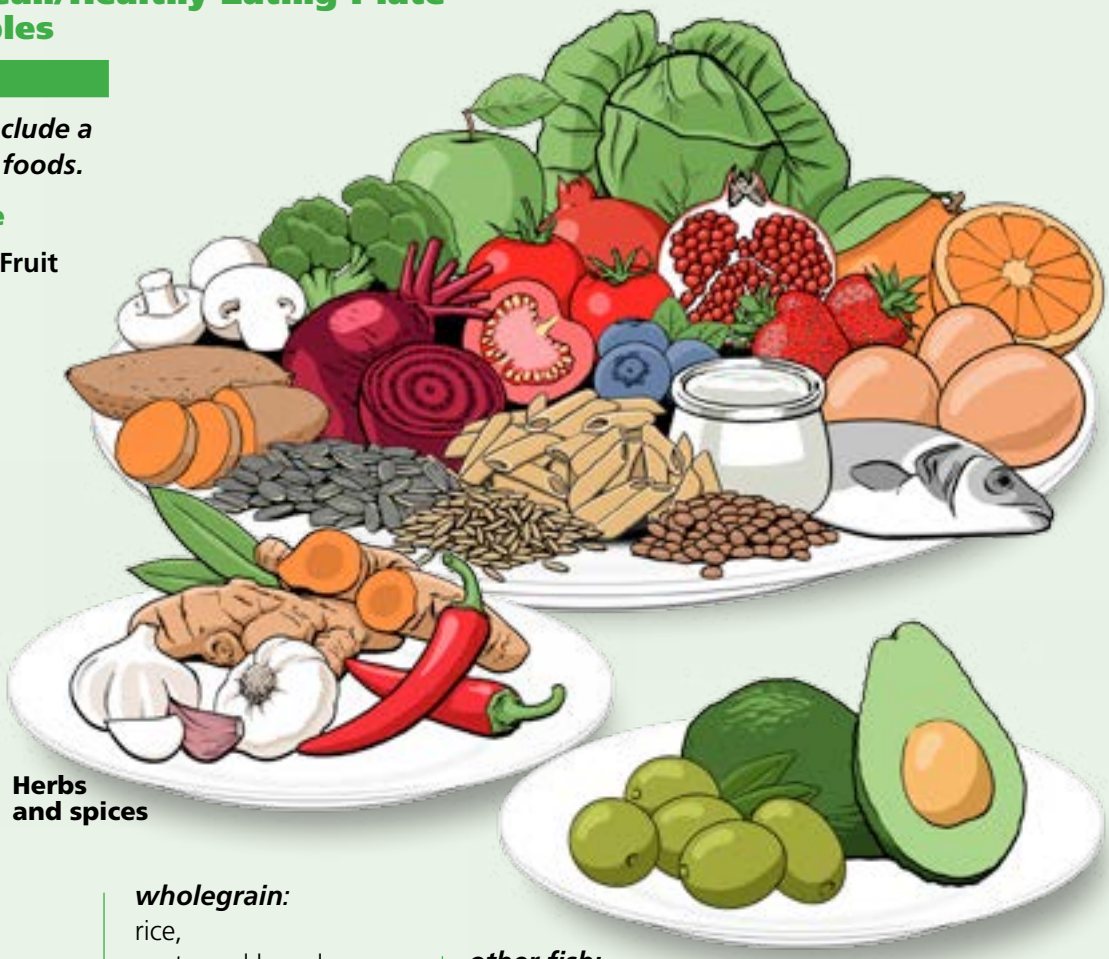
(Diagram adapted from the book "The Science of Plant-Based Nutrition" by Rhiannon Lambert, p87.)

or tinned. For example, frozen fruit in general has more antioxidants than fresh. In vegetables, some nutrients are higher in frozen compared to fresh produce, while others are less. Overall, both are good options providing nutrient dense foods and the best option for you is the one that allows you to buy and cook them as easily as possible.

The Mediterranean diet

One such pattern that comes well recommended is the Mediterranean diet, which is not a 'slimming diet' but a healthy pattern of eating based on the traditional cuisine of countries such as Italy and Greece, it does not describe what is eaten in Mediterranean countries today! (There was an extensive (Mediterranean and other countries) study started by Ancel Keyes in the late 1950's, early 1960's, that found a healthy eating pattern that countered cardio-vascular disease. For anyone interested in delving deeper, 'The Seven Countries study' findings now more than 50 years on, can be found at website link *https://www.sevencountriesstudy.com/study-findings/)*.

Mediterranean/Healthy Eating Plate – food examples



Daily

Every meal to include a variety of these foods.

PLANT – Base

Vegetables and Fruit

onions,
garlic,
avocado,
tomato,
carrot,
sweet potato,
beetroot,
brocolli,
kale,
brussels,
cabbage,
artichoke,
spinach,
peppers,
mushrooms

orange,
lemon,
apple,
kiwi,
blueberry,
blackberry,
raspberry,
strawberry,
pomegranate

Olives,
olive oil (extra virgin)

Herbs and spices

A few times a week

(oily fish at least twice a week)

Whole grains, beans, lentils, nuts, seeds, herbs and spices

oats,
quinoa

wholegrain:
rice,
pasta and bread.

chickpeas,
lentils,
a mix of coloured beans

walnuts,
almonds,
cashews.

pumpkin,
sunflower,
chia seeds,
flaxseed

Oily fish:
mackerel,
salmon,
sardines,
anchovies.

other fish:
white fish
prawns,
mussels,
oysters,
crab

Healthy fats
(Includes a variety of nuts. Extra virgin olive oil is also a healthy fat, e.g. used in a dressing with balsamic vinegar)

Weekly

(or small amounts)

Poultry, eggs, dairy
(goats, sheep, cows)

Red meat
(beef, lamb, pork, etc),
steak,
leg,
chop,
butter, potatoes

Less often

Sugary foods)

desserts,
cakes

There is no standard Mediterranean diet, but typically the main components could include:

- Daily vegetables, fruits, herbs, nuts, seeds, whole grains, legumes (e.g. beans or lentils) and healthy fats
- Twice weekly intake of fish (including oily fish)
- Weekly intake of seafood, poultry and eggs
- Only moderate amounts of dairy products
- Limited intake of red meat (only small lean amounts, once or twice per week)
- Plenty of extra virgin olive oil (which has anti-oxidant and anti-inflammatory properties)

Healthy fats, particularly olive oil, are a mainstay of the Mediterranean diet. Avocados, nuts and seeds also contain healthy monounsaturated fat.

'Following a Mediterranean Diet closely can lead to greater cancer risk reduction.' **[2]**

Please note that the 'Mediterranean diet' is not just about food and drink, but how food is grown prepared and consumed, about eating socially with friends and/or family, along with following an active lifestyle.

MIND, DASH and Portfolio diets

Some other dietary patterns are:

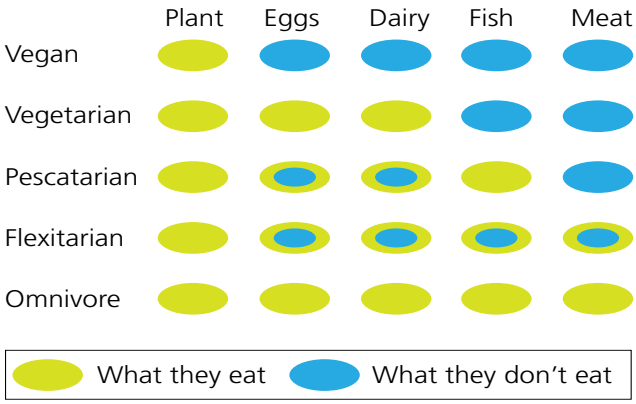
MIND - stands for 'Mediterranean-DASH Diet Intervention for Neurogenerative Delay, according to the British Association for Nutrition and Lifestyle Medicine (see *www.bant.org.uk*)' and was designed to target the health of the ageing brain, specifically Dementia and Alzheimers. It may also benefit heart health, diabetes, and certain cancers because it includes components of the Mediterranean and Dash diets which have been shown to lower the risk of these diseases… '

DASH - stands for 'Dietary Approaches to Stop Hypertension', a low-salt diet to combat high blood pressure, it may also lower LDL cholesterol. See mayoclinic.org and look for DASH diet: Healthy eating to lower your blood pressure

Portfolio diet – '… New research (28 Nov 2023, in Circulation), suggests the more closely you follow a portfolio-style eating pattern, the greater the protection against heart disease and stroke… Earlier studies found that the portfolio diet may lower LDL cholesterol by as much as 30%. In the new study, people with higher portfolio diet scores not only had better cholesterol profiles, they also had lower blood levels of C-reactive protein and other inflammatory substances… this diet discourages foods from animal sources, particularly red and processed meat, high-fat dairy and eggs, which means it's naturally low in saturated fat and dietary cholesterol, both of which raise LDL cholesterol in the body… '

See https://www.health.harvard.edu/heart-health/the-portfolio-diet-a-smart-investment-for-your-heart

Plant-based diet diversity



Adapted from the book "the Science of Plant-based Nutrition" by Rhiannon Lambert, Page 36

We suggest you develop, over time, a healthy eating pattern that is best suited for you, for the long-term, not just a quick fix. If you follow a Mediterranean dietary pattern you will not be eating large amounts of meat or poultry, so if you can afford it consider (organic) quality grass-pasture fed animal meats, and (organic) free-range poultry, rather than the cheaper products, as they can provide healthier nutrients and be lower in pesticides and antibiotics.

Also, rather than treating meat or poultry as the 'main event' on your plate, try using smaller amounts to enhance the flavour of dishes. There are recipes that can work well with just small amounts of meat or poultry within the dish, many such recipes are of Asian origin (consider it a form of a Mediterranean-Asian dietary pattern!).

Ideally, home-cooked whole foods can be the healthiest option, worth the extra time and effort, if you can.

'Flexitarian' diets are becoming popular ways of cutting down on meat, poultry and dairy without going full vegetarian or vegan. For example, eating fish or chicken at weekends, with very occasional red meat, otherwise eating mostly plant-based foods during the week.

CHAPTER 3

Macronutrients and Micronutrients

PROTEIN

Why do we need protein?

Protein provides energy (but not as much as fats and carbohydrates do) and is essential for the growth and repair of the body. Protein is needed for immune function, for bones, for red blood cells (needed for energy), repairing wounds (i..e. from surgery), for producing the chemicals (neurotransmitters) needed to regulate mood, stress responses and cognition and for maintaining muscle mass (along with exercise).

Amino acids are the building blocks of protein and different foods contain varying amounts and types of amino acids.

Blue Zone lifestyles – living long and healthily

Extracts below are from chapter 16 of the book, 'A Silent Fire – the story of inflammation, diet and disease' by Shilpa Ravella, first published in 2023.

'Not every old person suffers an identical fate. Some retain robust physical and mental fitness… but beyond genetic material and sheer luck is there something more that determines how long and… how well we live in our later years?

In 2004, demographers Michel Poulain and Giovanni Mario Pes… published a paper on a cluster of villages high in the mountains of Sardinia, Italy, with an incredible concentration of centenarians… the researchers had casually used blue ink to mark the area on a map and called it a "blue zone".

Around the same time journalist Dan Buettner, under the aegis of the National Geographic, set out to identify areas around the world with high life expectancies. He wanted to know why these individuals lived not only long but well, largely free of the physical and mental plagues of old age. Genes contributed, of course, but studies had shown that most differences in the length and quality of human life owed to lifestyle.

Buettner enlisted a team of medical researchers, including Poulain and Pes… the team identified additional blue zones around the world, places with the highest average life expectancies, with many inhabitants living for nearly a century or more. Aside from Sardinia, they featured the Greek island of Ikaria in the Aegean Sea; Okinawa, Japan; Nicoya, Costa Rica; and Loma Linda, California – home to one of the largest concentrations of Seventh Day Adventists in the world.

Blue zone dwellers consume a diet of around 95 to 100 percent whole plant foods eaten both raw and cooked...

People in blue zones enjoy a variety of seasonal vegetables and fruits, including those straight from the garden. Legumes loom large: cheap, versatile, and amenable to endless creations, from hearty Mediterranean minestrone or Nicoyan black beans and rice, to Okinawan soybeans squeezed or fermented into extra-firm tofu, tempeh, natto… which contain potent anti-inflammatory soy phytochemicals.

Soy often arrives with seaweed in Okinawa, as in a hearty miso soup, the wakame and kombu suffusing the brew with not only iodine and B12, but prebiotic fibres… Blue zone bread is typically whole wheat, rye, barley or sourdough and each day a small handful of nuts make their way into meals. Drink is mostly water and perhaps a morning coffee or teas – black, white or green – or simply wild herbs steeped in scalding water.

If animal foods are included in the diet, they mostly function as flavourings or side dishes. Minimal dairy, a couple of eggs, and a meager serving of lean chicken, lamb or pork - less than the size of a deck of cards - each week is typical. Fish, too, is eaten somewhat sparingly, around two modest weekly portions, with a focus in most areas on small fish such as sardines and anchovies, which are less prone to building up heavy metals like mercury or toxic industrial chemicals… which are known to adversely affect human health.

The blue zone diet, filled with fibre and other essential nutrients from whole plants, helps to cultivate salutary gut germs… in an ageing microbiome, which is prone to becoming… inflammatory over the years…

Okinawan elders follow the rule of hara hachi bu… **to stop eating when their stomach is 80 per cent full…** '

How much protein do we need each day?

Protein needes vary from person to person. If you have cancer, the World Cancer Research Fund recommends, as a rough guide, 1.0 to 1.5g per kg of body weight - e.g. 72g - 108g/day for a 72kgperson (158 lbs, or 11st 4 lbs). This is more than the standard protein requirement for an average person (0.75g per kg of bodyweight).

This increased protein intake is particularly important before, during and in the immediate recovery period from treatment, to prevent loss of muscle mass and help repair the body from surgery or treatment effects. Your doctor or dietitiancan advise you of any more personalised requirements, for example if you are underweight, losing weight or have additional health conditions that may also influence your protein requirements.

Additionally, if you are aged 40 - 50, or over, you will also need more protein longer term; again, around 1.0 to 1.5 grams of protein per kg of body weight.

If you are quite active you may also have increased protein requirements, particularly if regularly playing sport, or doing endurance and/or strength training. However, you should not exceed more than about 2.0 g of protein per kg of body weight (144g/day for a 72kg person) as this may be harmful. Seek advice from a dietitian or a sports nutritionist if you are very physically active.

The body cannot store excess protein so we need to consume, say, about 20-30g of protein with each meal (breakfast, lunch, dinner, and possibly also as a snack, if 4 times a day is appropriate) together with some carbohydrates and nutritious fats, as carbs and fats are our main energy sources.

Sources of protein

Some protein powders, shakes, shop-bought protein bars and foods boosted with protein may contain excess sugar salt, fat and additives. However there are also some brands that have a very good ingredients list.

Many healthy people should not require protein powders or similar and can consume adequate protein from whole food sources. However, due to the increased protein required when living with cancer, combined with some challenges to eating a normal diet during and after treatment (fatigue, nausea and other digestive symptoms), protein powder drinks or protein bars, can be a helpful way to meet your protein needs during this time. If you do need to use these products, choose the ones with the simplest ingredients list, or ask a nutrition professional for their recommendations.

Animal sources (meat, fish, eggs or dairy) can be a rich source of protein and contain the essential amino acids needed by the body.

Individual plant foods however, do not contain the full range of amino acids, but in most varied diets different plant foods combine to contribute different amino acids, e.g. beans or lentils are complemented by rice. So, if you are vegan you can still obtain all you need. Quinoa, also soyabeans, are complete proteins and contain the nine essential amino acids.

Some high-protein foods can be high in saturated fat. If you eat meat make sure it is unprocessed, lean, with most fat trimmed off and vary the type of meat, e.g. lamb, beef, pork or game (you may also wish to consider nutrient-rich liver or kidneys). With poultry, remove the skin before eating. If you drink a glass of milk with your meal, or have milk with your cereals, then choose a lower-fat version or a plant alternative such as unsweetened soya. Soya is the best plant milk for comparable protein and other nutrients to dairy. Oat, almond and rice milk contain minimal protein if any.

Protein-rich foods can help one feel fuller than carbohydrates or fats, so consume some protein with every meal, to reduce the feeling of hunger and hence help limit total energy intake (calories). Of this at least one meal a day should be plant protein. Typical protein portion sizes are: skinless poultry or lean meat 100g (without bone), 2 eggs, or 3 tbsp. nuts or seeds.

CARBOHYDRATES ('CARBS')

Carbohydrates can contain sugars, starches and fibre. They provide the body with its main energy source.

Simple carbohydrates are the less healthy ones, containing mostly sugars, either added sugars (where sugar is added as an extra ingredient) or sugar that naturally exists in the food. If these make up the majority

Typical protein content of foods

(g) per 100g (*British Nutrition Foundation*)

Meat	
Chicken breast (grilled, skinless)	32.0
Pork chop (lean, grilled)	31.6
Beef steak (lean, grilled)	31.0
Lamb chop (lean, grilled)	29.2
Fish	
Tuna (canned in brine)	24.9
Salmon (grilled)	24.6
Cod (baked)	23.9
Mackerel (grilled)	20.3
Seafood	
Crab (canned in brine)	18.1
Mussels (cooked)	17.7
Prawns (cooked)	15.4
Eggs	
Chicken egg (whole, boiled)	14.1
Dairy	
Whole milk	3.4
Semi-skimmed milk	3.5
Skimmed milk	3.5
Cheddar cheese	25.4
Reduced-fat cheddar	27.9
Dairy	
Cottage cheese	9.4
Plain Greek-style yogurt	5.7
Plain low-fat yogurt	4.8
Pulses	
Red lentils (boiled)	7.6
Chickpeas (canned)	7.2
Beans	
Tofu (steamed)	8.1
Kidney beans (canned)	6.9
Baked beans	5.0
Grains	
Wheat flour (brown)	12.2
Rice (easy cook, boiled)	10.9
Bread (brown)	7.9
Bread (white)	7.9
Pasta (dried cooked)	4.8
Porridge oats	3.0
Nuts	
Almonds	21.1
Walnuts	14.7
Hazelnuts	14.1

Source: McCance and Widdowson's The Composition of Foods. 2015

of carbohydrates in our diet, they can contribute to weight gain, increased risk of diabetes, heart disease and raised cholesterol. Examples are white bread, shop-bought cakes, sugary drinks, highly processed or refined foods.

'Added sugar and (to a lesser extent) refined carbohydrates are harmful because they are rapidly digested and absorbed, meaning they have a high glycaemic index (G.I.)… On the other hand low G.I. foods (foods low in added sugars and higher complex carbohydrates - see below) slow digestion and absorption, are far better for us as they produce gradual rises in blood sugar and insulin levels that our bodies are able to cope with… .The timing and total content of the entire meal can influence G.I. Carbohydrates eaten alone will be absorbed quicker, but pairing them with vegetables or fruits containing fat, protein and fibre will slow gastric emptying and reduce the impact on blood sugar levels' [3]

Complex carbohydrates – these are the healthier ones, many of which are starches, provided they have not been refined, take longer for the body to digest and hence less likely to cause spikes in blood sugar. They make fullness last longer, suppressing appetite, and thus helping to avoid overeating. Many are high in fibre, as below:

- ***Beans and legumes*** - black beans, chickpeas, lentils, pinto beans
- ***Fruits*** – apples (skin on), pears, oranges, peaches, berries, bananas (greenish)
- ***Nuts and seeds*** – almonds, peanuts, walnuts, pumpkin seeds, sunflower seeds
- ***Whole grains*** –brown rice, quinoa and other grains, oatmeal, cereals, wholemeal bread and wholewheat pasta
- ***Vegetables*** – broccoli, brussels sprouts, lima beans, root vegetables, sweetcorn

FATS

Saturated and unsaturated fats are both important for good health, but saturated fats from meat and high-fat dairy products should play less of a role than unsaturated fats. Butter is high in saturated fats, so if used spread it thinly, (some 'spreadable' tubs of butter are blended with rapeseed oil, so easier to spread thinly). Fats should be consumed in moderation to avoid weight gain (unless you need to gain or maintain weight during treatment), as all fats and oils are high in calories, including the healthier fats.

Trans-fats – Avoid trans-fats as they are not healthy. According to diabetes.co.uk, some countries have banned trans fats, but in UK food producers have been urged to reduce them, so read the labels to find out. Trans fats are also known as 'partially hydrogenated oils/fats' or 'shortening'

'Trans fats and saturated fats from fatty animal foods. are known to raise cholesterol (including LDL cholesterol which negatively affects the cardiovascular system) and therefore increase the chances of:

- Developing heart disease
- Strokes
- Liver dysfunction
- Type 2 diabetes
- Alzheimers

Trans fatty acids not only raise the bad LDL **cholesterol**, they also reduce the healthy HDL cholesterol. Research has also showed a possible link between trans fats and reduced **insulin sensitivity**. It is widely agreed that trans fats are significantly more damaging than saturated fats (animal fats). Foods which may contain trans fats are typically sweet, **carbohydrate based foods** or those with relatively short shelf lives.

Trans fats have typically been present in the following foods:

- Margarines
- Vegetable oils
- Cakes
- Doughnuts
- Pastries
- Ice cream
- Bread
- Fast food

Reading the ingredients list on food produce may help to identify foods which contain trans fats. However, whilst UK food producers have agreed to cut trans fats out of their ingredients, it is thought that a number of foods still contain them, listed as 'mono and diglycerides of fatty acids', which can be found in many products including doughnuts, pastries, ice cream and bread.' [4]

Unsaturated fats are:

Mono-saturated fats - can help reduce cholesterol and lower the risk of heart disease – e.g. avocados, olive oil, rapeseed oil, peanuts.

Poly-unsaturated fats – there are several subsets, of which Omega-3, Omega-6 and Omega-9 fats are the main ones. Most of us probably get enough, or too much, Omega-6 fats. They are both essential within our diets, but it is important we try and get more Omega-3 fats, to help reduce chronic inflammation and the risk of cancer. Omega-3 fatty acids are the building blocks for nerve and brain tissue and help our heart beat regularly.

Omega-3 examples are: walnuts, pecans, chia seeds, hemp, flaxseed (linseed) and oily fish, such as salmon, mackerel, sardines, herring, tuna, trout, pilchards, anchovies. Fish oil is great source of Omega-3.

Our bodies do not convert much of the plant-based omega-3 into the active form, so it is best to augment these sources with oily fish, or fish oil. Vegan algae-based supplements are available to augment nuts and seeds when fish can't be consumed.

Omega-6 examples are refined vegetable oils, e.g. sunflower, peanut or sesame oil, also found in processed or fried foods, biscuits etc.

Olive oil – this is an important healthy fat, which contains Omega-3, 6 and 9. The least processed and most healthy is Extra Virgin Olive Oil (EVOO, for short).

Balancing the omega-6 to omega-3 ratio. For the health of cells an ideal ratio of omega-6 to omega-3 fats would be about 3 to 1, however modern diets have a far higher number of omega-6 fats. The favoured straightforward approach is to increase consumption of omega-3 fats, and cut back on the unhealthiest sources of omega-6 fats, such as breaded and fried foods, also limit processed foods that use industrialised omega-6 seed oils. However, it is important to note that we do need some omega 6 in our diet for a range of important bodily functions.

FIBRE

What is dietary fibre and why do we need it?

Fibre is a particular type of carbohydrate that we cannot digest, it passes mainly unchanged through our intestines, so it supplies no calories to us. It is only found in plant foods, acting as their cell walls and skeleton, hence the 'chewy' nature of many, but not all, plant foods. Eating enough fibre (30 gram per day) may be one of the best things we can do for our health, however most people do not eat enough.

New Scientist magazine 2nd Nov 2024, within its story 'The Smart Guide to Nutrition', contains an article on pages 36/37 entitled 'What's the real supernutrient we do not get enough of?' Some extracts are below:

" Many of us will have experienced first hand the effects of dietary fibre on our body. Sometimes dubbed 'nature's laxative', a lack of it can cause constipation. But there is much more to fibre than bowel movements. Diets high in this constituent are associated with reduced risks of many health conditions, including cancers and heart disease… fibre is also food for the microorganisms in our gut..its effects can be felt throughout your body as this microbiome influences the health of our immune system, brain and more, via the chemicals it produces… 'The evidence for dietary fibre is now overwhelming ' says Jim Mann at Otago University in Dunedin, New Zealand. He co-authored a 2029 meta-analysis covering 185 studies that tracked 58 clinical trials. This found that people who ate the most fibre had a 15-30 per cent lower risk of all-cause and cardiovascular-related death over the study period. They also had lower incidence of colorectal cancer, stroke, coronary heart disease and type 2 diabetes… a number of randomised controlled trials show that high-fibre diets lead to lower blood pressure and cholesterol levels… we know that a community of microorganisms, paticularly bacteria, feed on fibre in the large intestine…

Fibre

'Fibre me up' - an extract from 'Genius Gut' by Dr Emily Leeming – Page 117

What you eat can change how you feel – your energy, your mood and your well being. If there was just one thing, one change you could make to what you eat, that has the biggest impact on the health of your gut and gut microbiome – it's to eat more fibre, the roughage from plant foods (a key feature of the Mediterranean diet). Every 5g of fibre you eat is related to a 5% lower likelihood of depression (Saghafian F, Hajishafiee M, Rouhani P,Saneei P, Dietary fibre intake, depression, and anxiety). People who eat more fibre tend to perform far better in cognitive tests, like on memory and problem solving (Sun W, Chen C, Lu Z, Zhang D, Dietary fibre intake is positively related with cognitive function in US older adults). The added bonus? Foods that are high in fibre tend to be nutrient dense, meaning plenty of bioactive compounds for your gut and brain health and overall well-being too. Fibre is essential for a healthy gut and a thriving gut microbiome, and certain types of fibre have been shown to support your mood and how well you think.

Food	Quantity	Fibre(g)
Mixed nuts	2 handfuls	5.1
Pear	1 large	4.9
Rasberries	½ cup	5
Baked beans	¼ can	5.1
Red kidney beans	5 tbsp	5.1
Peas	4 tbsp	5.6
Edamame beans	½ cup	4.2
Brussels sprouts	8 sprouts	5.3
Broccoli	4 spears	5
Green/brown lentils	tbsp	5.5
Whole wheat pasta	medium portion	5
Bran flakes	small portion	5.4
Porridge oats	1 cup	6.2
Bulgur wheat	½ cup	4.7
Rye crispbread	3 pieces	6
Flaxseeds	2 tpsp	5
Chia seeds	½ tbsp	5.9
70-85% dark chocolate	½ bar	5.5

But it isn't all about the microbiome. Fibre also leads to us to feel less hungry by stimulating the release of an appetite-reducing hormone in the small intestine, plus it slows the absorption of glucose into the blood.

There is emerging evidence that different kinds of fibre have differing effects. A 2023 review found that insoluble fibre seemed to be more effective than the soluble form at reducing the risk of death from cancer and cardiovascular disease. It also found that fibre from whole grains , cereals and vegetables was associated with lower all-cause mortality, while that from nuts and seeds specifically reduced the risk from cardiovascular disease. Similarly Mann says fibre from legumes seems to have the strongest effect on blood glucose levels, while cereal fibre tends to mostly affect the bowel. So, as ever with food, variety is good. "

Extracts below are from the book 'The Science of Plant-based Nutrition', by Rhiannon Lambert, p74-75

" There are two main types of fibre, soluble and insoluble, although many foods contain both types (ratio varies).

Soluble fibre dissolves in water and turns to gel during digestion, slowing the digestive process, which helps keep blood sugar levels stable. It is found in foods such as oats, nuts, seeds, lentils, peas, beans, and some fruit and vegetables.

Insoluble fibre does not dissolve in water, but is partly broken down by fermentation. It is the main food source of gut microbes and it helps to keep things moving along the digestive tract..it is found in foods including wheat bran, vegetables and wholegrains. "

The UK recommendation is that adults eat around 30g of fibre in their diet every day… exceeding that could provide even better protection for our health. If increasing the fibre in your diet, add it slowly and drink plenty of water because a sudden increase can cause problems such as bloating and loose bowel movements. If you have any medical conditions affecting the digestive system, are experiencing digestive symptoms as a result of your cancer or cancer treatment, or have been placed on a medical diet due to your cancer or other conditions, seek the supervision of. a doctor or nutritionist before making such a change.'

For those who want further information there is an informative Dietary Fibre article from the Canadian Gastrointestinal Society at *www.badgut.org*. It states that soluble fibres are especially beneficial for individuals with diarrhea as they help slow down transit time, whereas insoluble fibre is the best type for constipation, as it helps draw water into the stool to soften it and can help speed up transit time.

Gluten - some people may need to avoid/limit gluten, which is a frequent cause of bloating and other bowel issues.

Sources of fibre

The easiest way to get a good balance of soluble vs. insoluble fibre is to pick and mix your fibrous foods from the following food groups:

- ***Nuts and Seeds*** - chia seeds, flaxseed, sesame seeds, pumpkin seeds, peanuts, almonds, walnuts
- ***Pulses*** – chickpeas/hummus, lentils, garden peas, beans (red kidney, white, adzuki, endamame, baked beans)
- ***Fruit*** – berries (raspberries especially), avocado, pears
- ***Vegetables*** – carrots, parsnips, kale, brocolli, Brussels sprouts, cabbage
- ***Grains*** – oats, bran (oat or wheat) barley, bulgar wheat, whole grain pasta, wholemeal bread, rye bread (wholemeal flour has a high insoluble fibre content, whereas rye flour has the most soluble).

The list of fibre sources above is mainly drawn from several articles including:

Dietary Fibre article from the Canadian Gastrointestinal Society at www.badgut.org

An 'Eat more Fibre' article by Anita Bean, health writer and registered nutritionist, writing in Waitrose Food magazine April 2023.

'Dietary Fibre-Your Body's Best Friend' in magazine 'Living Without Inflammation', Jan.2023, pages 42-47.

POLYPHENOLS

Plant foods with extra health benefits

Plant foods have chemical properties (called 'phytochemicals') which provide nutritional benefits to us. At the low end of nutritional benefit for example is cucumber, which is mainly water (although it does help a little with hydration), however polyphenol-rich foods are high up the scale, possessing not only numerous nutritional benefits for general health, but also specific extra benefits according to their individual chemical make-up.

In extracts from an article 'Power up with Polyphenols' in Waitrose Food magazine, February 2025, Dr Emily Leeming, microbiome scientist, dietitian and author of the book Genius Gut, explains:

" In simple terms, polyphenols are natural compounds found in a wide range of plant foods. They act as anti-oxidants helping protect the plant from disease and sun damage. In humans they play a protective role too, helping to reduce inflammation and oxidative stress, which can contribute to chronic diseases."

Polyphenols are also good for your gut health… Polyphenols may also play a role in protecting the brain from ageing and neurodegenerative diseases such as Alzheimer's… Polyphenols are connected with longevity, too… researchers have found a link between high polyphenol consumption and a 30% decrease in mortality in over-65s… it's about incorporating as diverse a range of fruit, vegetables, legumes, nuts, seeds, herbs and spices into your diet as possible… " many of the best sources are herbs and spices, beans, berries and nuts" says Emily… Foods particularly rich in polyphenols include cocoa powder, black beans, lentils, chestnuts, walnuts, blackcurrants, blueberries, blackberries, plums, red onions and olives…

Aim to include a range of different-coloured foods in your day, greens, oranges, reds and purples… the more vibrant the colour the more polyphenols it contains (e.g. red onions are more polyphenol-potent than yellow varieties)… these tiny compounds are found in all types of plants: in fact, the peel, or skin is often higher in polyphenols than the flesh (e.g. the peel of an apple could contain up to five times more polyphenols than the rest of the fruit).

Polyphenol-rich foods

In extracts from Chapter 16 of his book, Keep Healthy after Cancer, Professor Robert Thomas explains:

" Asian and Mediterranean diets are typically abundant in polyphenol-rich vegetables, salads, herbs, spices, teas, nuts, fruits, seeds and legumes. Typical western diets, on the other hand, are dreadfully deficient in polyphenols, meaning we need to eat a lot more of them with every meal of the day… polyphenol-rich foods are all around us and readily available in most local supermarkets.

Tomatoes and lycopene: Unlike other phytochemicals, beta-carotenes such as lycopene are not destroyed by the cooking process… while they are only found in relatively small quantities in tomatoes, higher concentrations can be found in tomato sauces and pastes. An analysis… indicated that men with diets rich in tomatoes and tomato sauces had a lower risk of prostate cancer. This finding has been confirmed in other population studies. This benefit was attributed largely to lycopene, but it should be noted that tomatoes have other polyphenols, vitamins, fibre…

Cruciferous vegetables: This group of vegetables have long been hailed for their myriad of health benefits. Sources include brocolli, cabbage, bok choy, kale, caulifower, asparagus, Brussels, mustard, horseradish, wasabi, watercress, radish and garden cress… they contain fibre, vitamins and other healthy nutrients… studies have found that people who eat cruciferous vegetables regularly have a decreased risk of prostate and breast cancer, and the cancers they develop tend

to be less aggressive and less likely to spread… the isothiocyanates in cruciferous vegetables promote the formation of one of the main anti-oxidant enzymes GST. This important enzyme, normally located in the liver, is particularly valuable in dealing with environmental pollutants… food additives, hydrocarbons and pesticides. GST neutralises these toxins, so they don't damage cells and cause cancer.

Radish, mustard and cress: As members of the cruciferous vegetable group, radish, mustard and cress are high in GST (glutathione transferase). Because they are usually eaten raw, they also have particularly high levels of the enzyme myrosinase… required to convert GST into the bioactive sulforaphane form… Studies have shown that adding some radish, mustard or cress to the plate will enhance the formation of sulforaphane, even from cooked vegetables.

Herbs: They are usually taken in small amounts, but in countries such as Japan and India, where they are used extensively in everyday cooking, they represent major sources of phytonutrient intake. This may be one of the factors behind a lower cancer risk in these populations. Drying and grinding herbs increases their phytochemical content 5-fold. It's a good idea when cooking spicy foods to add as many herbs as possible such as paprika, chilli, black pepper, basil, rosemary, oregano, marjoram, coriander, sage and parsley. For desserts, do not hold back on real cinnamon, raw cocoa powder and vanilla.

Curcumin (Turmeric): Turmeric is a flowering plant of the ginger family. Aside from contributing a vibrant taste to curries and casseroles it is rich in fibre, vitamin B6, C, magnesium and iron, alongside polyphenols called circuminoids… It may also contribute towards the reduced formation of cancers by minimising chronic inflammation, reducing oxidative stress by enhancing anti-oxidant enzymes…

Pomegranate: The seeds and skin contain a variety of natural chemicals (the ground and dried seed is more effective than the juice) these polyphenols have been shown to inhibit

proliferation and markers of migration, while also inducing apoptosis and cell adhesion in breast and prostate cancer cell lines (*although robust human evidence is needed to confirm this*). Some studies suggest pomegranate is particularly helpful for prostate health, as there is a tendency for their metabolites to accumulate in the prostate gland.

Green tea: both green tea and the black stuff we've been drinking in the UK for several hundred years come from the same plant. When the leaves of the Camellia sinensis plant are dried, they are fermented and oxidised to form the black tea we are familiar with. Green tea is unfermented and is merely steamed. Reassuringly both variants contain good quantities of the active polyphenol, epigallocatechin gallate (EGCG). By blocking the G1 phase of the cell cycle, while concurrently blocking de-differentiation and angiogenesis, tea has been associated with a reduced risk of breast and prostate cancers, alongside an overall healthy diet. As well as cancer, the polyphenols in green tea have also been shown to protect against heart disease by preventing the oxidation of LDL into cholesterol.

Phytoestrogenic foods:… reduce the risk of breast and prostate cancer as well as decreasing the risk of relapse after radical treatments. Lignan polyphenols are found in many healthy foods particularly in the outer layers of whole grains and seeds. People who only eat refined grains and seeds with the outer husks removed are likely to have an inadequate intake. Lignan-rich foods include: - flaxseeds and sesame seeds, pulses such as beans, lentils and peas – pumpkin, sunflower, poppy seeds, quinoa and buckwheat – unrefined whole grains such as rye, oats, barley.

Isoflavone polyphenols are found in soya products and pulses, both of which are eaten in considerably higher quantities in the Far East. Typical isoflavone foods include: – fermented soya produce, miso, natto, tempeh – unfermented soya produce, tofu, soy milk, soybeans (endamame) – peanuts, chickpeas, fava beans, alfalfa, kudzu tea.

Several observational studies have reported an association between a regular intake of plant lignans and isoflavones, and a lower risk of developing lifestyle-related diseases such as cardiovascular disease, osteoporosis and cancer… After cancer, soya products, particularly those which are fermented (miso, tofu, tempeh) and more easily digested, are also beneficial because they reduce the risk of osteoporosis, relapse rate and improve the chances of overall survival… Lignan polyphenols have also been associated with a decreased risk of adverse effects from radiotherapy.

Onions, garlic and leeks: These are particularly rich in the antioxidant polyphenols quercetin, gallic acid and kaempferol. Their regular intake is linked with a reduced incidence of the cancers of the lung, oesophagus and pancreas, especially among smokers and alcoholics. These polyphenols are damaged somewhat by heat, so it's better to introduce raw onions in salads.

Berries and fruit: Virtually all edible berries and fruit are an excellent source of vitamin C, fibre and minerals and are abundant in many categories of polyphenols…

Red wine: While beer, cider and white wine contain some polyphenols, red wine is particularly rich in the pigmented polyphenol resveratrol. It's a class of compounds produced as part of a plant's defence system against invading fungus or ultaviolet irradiation disease. Spanish wines have the highest levels among the red wine variety, followed by the Pinot Noir varieties… there is conflicting evidence surrounding the alleged health benefits of red wine… Overall, the World Cancer Research Fund and World Health Organisation state there isn't a confirmed safe amount of alcohol with regards to cancer risk. However, some isolated studies including research published in the International Journal of Cancer shows that drinking a glass of red wine a day may cut a man's risk of prostate cancer in half, with the protective effect appearing to be strongest against the most aggressive forms of the disease.

In general it is advisable to focus on other food sources of polyphenols (e.g. purple and red fruits and vegetables). However, if having an occasional alcoholic drink has social and emotional benefits for you, the good quality red wine is likely the best option due to its polyphenol content..

Chocolate: In its natural form, cocoa has many nutritional benefits and is a valuable source of essential minerals, including magnesium, manganese, zinc and copper, while also being a rich source of polyphenols, particularly the flavanoids epicatechin, catechin and procyanidins… chocolate offers an array of benefits in small amounts but avoid added sugar or excess quantities.

(Ed: *At least 70% + dark chocolate (85% is even better), from 20g to 45g per day, is a good source of magnesium, polyphenols and fibre*).

How to boost polyphenol intake:

Soups: Most polyphenols survive a degree of cooking, making soups an ideal way to guarantee an effective intake. Tomato soup significantly increases lycopene intake, making it perfect for those not keen on raw tomatoes. A vegetable broth flavoured with extra spices and herbs and consumed before a meal tends to fill the stomach, helping with weight loss regimens, while brocolli, onion and pea soup, with a sprinkle of turmeric and a generous twist of fresh ground black pepper, constitutes the perfect superfood mix… the amazing response one man with metastatic prostate cancer had to brocolli soup. To get the

most out of soups eat them with a fresh salad containing raw onions, lettuce or radish… add pepper liberally, as the peperine it contains helps bioavailability of the polyphenols in both the vegetables and other spices. You may also want to add extra protein (beans, lentils, chickpeas, shredded chicken, fish, chopped egg), unsaturated fat (e.v. olive oil drizzled on top, ground almonds stirred in) or fibre (seeds sprinkled on top, beans, lentils), to help make a soup a balanced meal to keep you fuller for longer and give you the range of nutrients you need.

Shots: Some food outlets are offering healthy shots (50 ml) of polyphenol-rich ingredients. The fact they are not heated means they preserve their nutrient and polyphenol content. Common shot blends include ginger with apple, and turmeric and chilli with orange juice… It is possible to make your own by grating fresh ginger into a small apple juice and adding a twist of lemon… it is also possible to make ginger shots with a high-powered blender, a technique which gets much more out of the root… if you don't like the bits pour the blend through a fine mesh… For a green shot, try combining a 2cm length of clean ginger with half a small green apple, 1 cup of packed spinach leaves and half an avocado, before adding the juice from 1 large lemon and a small pinch of cayenne pepper.

Blending grains and seeds: Although individual foods can be very healthy, mixing them together is a fantastic way to provide your body with a great variety of essential nutrients… Most health food shops now sell mixed grains and seeds… You can however, make your own superfood grain mix very easily… Linseeds (also known as flaxseeds) tend to pass through the system untouched, unless crushed. When broken down their valuable omega-3 fatty acids, proteins and polyphenols are released and made available for absorption. They can be mixed with seeds, nuts and berries for extra taste and nutritional value. They are an excellent source of fibre – a tablespoon of this mix a day will displace the need for laxatives and help bring down blood cholesterol and BP. A batch can be placed in an airtight container and used over several weeks. The mix can then be added to cereals, porridge, live yoghurt, milk, smoothies or soups. Remember to clean the container throughly before adding the next batch in order to avoid moulds. The mix can be altered each time depending on your nutritional needs. "

CHAPTER 4

Foods and Drinks

Food and drink to AVOID or minimise

Consuming a high level of refined and/or processed carbohydrates, from a variety of foods and drinks, is a key problem. Unless we are burning off those 'empty calories' quickly, the build-up simply converts to fats, including 'visceral fat' [toxic abdominal fat stored around internal organs]. This is hard to shake off, and may contribute towards a disrupted metabolism that can affect hormonal health and may be associated with an increased risk of some cancer types. [See Summary on pg 68]

Eating too much red meat can also be a problem. The Jama Network published an article on 1st May 2024 called 'Plant based diets and disease progression in men with prostate cancer' (*jamanetwork.com/journals/jamanetworkopen/fullarticle/2818122?resultClick=3*), Their findings suggest that consuming a primarily plant-based diet may be associated with better prostate cancer–specific health outcomes among men with prostate cancer.

> **Note:** the study found an association between diet and prostate cancer risk, but that has not proven cause and effect.

In his book 'How to Live', Professor Robert Thomas explains on pages 52-54 how cancer rates are lower among vegetarians, but that for meat eaters it is not just the quantity of meat that matters, but also the quality.

What to AVOID - if we can't totally cut out these, then we should at least make a significant reduction in the frequency and amount that is consumed:-

Processed meats such as sausages, hot dogs, bacon, salami etc., corned beef, luncheon meat, ham (but Serrano, Parma ham or Prosciutto are ok as prepared in a healthier way). Also try and avoid meat or fish which has been smoked or cured using nitrates and/or nitrites. Smoked fish has not been linked to the same negative health outcomes as smoked meats at this time, but it is still advisable to get the majority of your fish from unsmoked sources.

'Processed meat is generally energy dense, can contain high levels of salt, and some of the methods used to create it generate carcinogens' **[5]**

Highly processed foods (where nutrients have been lost in processing and additives included, often shown as a long list of ingredients on the packet!) such as most packaged ready meals. Some processed products, can be labelled 'healthy', but may have considerable added sugar, saturated fat, salt and additives, etc.

They are designed to be very tasty and often are, making them difficult to resist eating and buying them again. However we need to decide what is healthy for us and not rely on marketing claims on packaging.

Refined foods (e.g. those using grains where processing has removed the healthy bran and kernel) such as white bread, white rice and white pasta.

Sugary foods such as sweets and chocolate confectionary, sugary breakfast cereals, biscuits. High sugar consumption can lead to a number of serious health issues, not just bad teeth. Excess sugar consumption over long periods is associated with obesity, insulin resistance and diabetes. Dysregulated metabolism in these conditions may contribute towards abnormal IGF-1 levels, which may in turn influence cancer risk. However, there are many factors affecting both IGF-1 levels and cancer risk, and the relationship between IGF-1 and cancer is not fully understood. It is still suggested that regular exercise and a balanced diet with moderate animal foods and high fibre, supports a healthy metabolism and normal IGF-1 levels (IGF-1 is also needed for many important bodily functions).

Foods cooked at high temperatures and charred foods should be avoided as the overcooking produces acrylamides which are carcinogenic, e.g. potato chips, crisps, vegetable crisps, burnt toast. If meat is to be barbecued, firstly marinate it with herbs, part-cook before it is barbecued, then cut off any burnt bits before eating. **[6]**

Sugary drinks - it is best to avoid drinks containing sugar, especially … 'processed drinks' with their heavily sugared contents (a can of Cola contains approx. 9 teaspoons of sugar). Consuming a lot of sugar (even just two or more sugary soft drinks a week) increases the risk of cancer. **[7]**

It is best not to add sugar to tea or coffee.

Fruit juices - it is best to generally avoid buying and drinking packaged fruit juices, but if you do so occasionally, then only choose those that have not had their pulp removed and that state 'not from concentrate', then limit the amount you drink, as many fruits are used in a carton. It can be easy to rapidly consume a large amount of sugar, even if you juice your own at home. Preferably eat whole fruit as it takes longer to digest, so avoiding a 'sugar hit'.

Where we suggest Avoid' or 'Limit', occasional treats are still o.k. The main benefit is by following a healthy eating pattern (e.g. Mediterranean diet) over the long term. However, if you are trying to fight hard against your cancer, the closer you adhere to the healthy eating pattern, the better the potential results.

What about alcohol?

Alcohol consumption, even at moderate levels, may cause cancer and weight gain. If you choose to drink, just have 1 or 2 small (125 ml) glasses of red wine, with a meal, and also drink some water. Do not drink on an empty stomach. Beers, wines and spirits with low or zero % alcohol are now readily available. Do not drink and smoke, as it more than doubles the risk.

Alcohol is quite an important topic of personal choice, as many people enjoy drinking for relaxation and socialising, which are beneficial mental wellbeing aspects to consider when dealing with cancer. While a small amount of alcohol might provide some benefit, especially if it is red wine, as soon as the amount goes up, e.g. drinking 3 or 4 glasses per day, the risks escalate rapidly. It also depends on where you are personally at with your cancer and treatment, so consult your doctor as to what, if any, alcohol is a safe level for you.

The World Cancer Research Fund states on their website

'To reduce your cancer risk as much as possible, we recommend not drinking alcohol at all. If you do choose to drink alcohol, follow national guidelines. In the UK, the guideline is to drink no more than 14 units a week, spread over at least three days for both men and women'.

In his book 'Keep Healthy after Cancer' Professor Robert Thomas has Chapter 13 on 'Alcohol after Cancer'. He notes on page 191 as to red wine

'the natural antioxidant polyphenols it contains are known to reduce inflammation and enhance healthy bacteria in the gut.'

He also noted that 'the most important polyphenol is resveratrol and that Malbec, Syrah and Pinot Noir boast particularly high resveratrol contents'.

Prostate Cancer UK state on their website - '

drinking too much alcohol can make you put on weight. Being overweight may increase your risk of being diagnosed with advanced or aggressive prostate cancer'.

They also state 'If you have urinary problems after treatment, try to cut down on alcohol as it can irritate the bladder and make these problems worse.'

On the NHS website they have an 'Alcohol Units' section. For wine at 12% volume a small 125ml glass is 1.5 units, a standard glass 175 ml is 2.1 units, a large glass 250 ml is 3 units. (Spirits at 40% are 1 unit for 25 ml, a pint of beer at 5.2% is 3 units).

Foods for health

Fish: aim to eat at least two servings of fish each week, including oily fish. Fish can help protect against prostate cancer. Oily fish can be a good source of healthy Omega-3 fats.

See the BBC Good Food oily fish guide *https://www.bbcgoodfood.com/health/nutrition/oily-fish-guide*

Shellfish:
scallops, mussels, clams, oysters, crustaceans: crab, lobster, prawns.

'Typically, all shellfish is low in calories and a good source of protein and healthy fats, as well as a good array of

nutrients, including zinc, B12, iron and selenium. They are also more nutritious if they are steamed or baked rather than breaded or fried.'

'Shellfish – especially crustaceans – are high in amino acids, known as the 'building blocks' of protein as we need them for growth and repair and the synthesis of hormones and neurotransmitters.

Shellfish, especially mussels and oily fish, contain polyunsaturated fats (PUFAs) and good levels of omega-3 fatty acid. These PUFAs can help lower LDL (bad) cholesterol and reduce the risk of heart disease.

Certain shellfish are high in carotenoids, including beta-carotene that converts to vitamin A when consumed. Carotenoids are powerful antioxidants – vitamin A in particular is needed for healthy immunity.

Most shellfish are high in vitamin B12, an important nutrient required for healthy bone formation. Low levels of vitamin B12, can increase your risk of osteoporosis as you age.'
https://www.bbcgoodfood.com/health/nutrition/shellfish-guide

Caution: some people are allergic to shellfish and shellfish have to be cleaned and prepared properly. For more information see the BBC Good Food shellfish guide mentioned above.

Cruciferous green vegetables: mainly broccoli, cabbage, kale, cauliflower, brussels sprouts and watercress. There is a saying "cancer hates cabbage", and for good reason. Studies have indicated vegetables from the cabbage family may help to significantly reduce the risk of prostate cancer, and may may be associated with a reduced risk of cancer progression. This occurs by complex 'phytochemicals' which reduce inflammation, promote anti-oxidant enzymes and even repair damaged DNA cells. Cruciferous vegetables should be consumed daily to protect against prostate cancer. Home-made vegetable soup is one way to achieve this (e.g. cruciferous vegetables with lentils and beans).

Chilli peppers: contain a natural compound called capsaicin, which may be associated with a reduced risk of cancer progression and potential metabolic benefits.

Grains: including quinoa, beans and lentils. As unrefined whole grains, these can reduce the risk of prostate cancer and help protect against future relapse. They contain lignan polyphenol compounds, which influence 'oestrogen receptors', help repair healthy cells, post-radiotherapy, and are beneficial for maintaining bone density.

The top three breakfast cereals recommended by the British Heart Foundation are: Porridge, Muesli (no added sugar), Shredded Wheat.

See: BHF - Breakfast cereals ranked best to worst.
https://www.bhf.org.uk/informationsupport/heart-matters-magazine/nutrition/breakfast-cereals-ranked-best-to-worst

For the BDA Food Fact Sheet: Wholegrains, see *https://www.bda.uk.com/resource/wholegrains.html*

Ground flaxseed is particularly beneficial.

'Flaxseed is an excellent source of both soluble and insoluble fibre, healthy phytochemicals and omega fats… .particularly omega 3'. **[8]**

Nuts

"… Nuts deserve a medal as the give you the whole package. In taste, nutrition and also purely botanically, there is a big difference between walnuts, hazelnuts and all the others in the nut family, but the common feature is that behind the hard shell is a wealth of healthy substances that strengthen the body from head to toe. One of the great advantages of nuts is the combination of roughage, healthy fats and phytochemicals, which together make them perfect heart medicine and, among other things, lower the blood content of the potentially harmful LDL cholesterol.

You should eat about 50 grams of nuts per day… choose different nuts, and eat them in their natural state (if they are covered with all sorts of appealing coatings, the health benefits will be reduced)… Nuts contain quite a few calories, but … in many studies participants succeeded in losing weight, even though they ate nuts every day, because they provide a great sense of satiety and make you eat less. As an added bonus you can even look forward to the fat being redistributed in a more healthy way across your body, indicating that nuts, as some studies have shown that a diet rich in nuts and other healthy foods, are associated with reduced visceral fat and therefore a reduced risk of

cardiometabolic disease..

Best nuts for:

- **the heart:** pecans, cashews
- **muscles:** groundnuts (peanuts), almonds
- **joints:** walnuts, hazelnuts
- **the stomach:** almonds, coconut
- **the brain:** almonds, hazelnuts " [9]

Nuts are high in unsaturated fats. A wealth of data - including observational studies and randomised controlled trials - show that they protect against many chronic inflammatory diseases including heart disease, stroke, cancer, and diabetes, as well as untimely deaths from any cause. They lower cholesterol levels and inflammation, especially when they replace meat, dairy, eggs and refined carbohydrates, decreasing inflammatory biomarkers like CRP, IL-6 and TNF. They are rich in fibre, polyphenols, vitamins and minerals. Eating a small handful of nuts each day can lower the risk of chronic inflammatory diseases and lengthen life. [10]

Nut butters - another way to eat nuts is with good quality nut butters, which can be eaten, say, on toast or crackers, or added into savoury or sweet dishes. Peanut butter, and almond butter may be two of the most well known, but there are several others. Check the label to see there are not too many ingredients apart from the nuts. Nuts, and nut butters go well with chocolate, and there are also nut butters with chocolate spreads.

Seeds

Flaxseed (also known as linseed), soaked seeds gel, and can aid digestion.
Used in bread dough.

Pumpkin seeds are high in iron and are exceptionally nutritious. They contain anti-oxidants also provide protein, healthy fats and fibre. A source of magnesium, phosphorus and zinc, all important for healthy bones. Eat them raw, roasted or in dishes. They also work well in bread. (You can buy seeded bread flour that contains for example, sunflower seeds, flaxseed and pumpkin seeds).

Chia seeds are high in (soluble) fibre and omega-3 fat, are anti-oxidants and contain manganese. They are good in home-made bread dough, a few grams in a large loaf. Can be sprinkled over porridge or muesli.

Sunflower seeds contain vitamin E and selenium, which may help the immune system. They also contain iron. Soaked sunflower seeds can form a gel which can aid digestion, toasted sunflower seeds can be tasty. Used in muesli or home-made bread.

Caraway seeds contain essential oils and are good for treating indigestion and bloating. They also have plenty of flavour and are good in bread dough.

Sesame seeds are flavoursome and used to make tahini paste. They contain folate and iron. Frequently used on, or in, bread.

Coriander seeds are high in fibre, contain calcium, iron and other minerals. Used in making curries.

Poppy seeds contain anti-oxidants, iron and calcium. Used on, or in, bread.

Nigella seeds (also known as Black Onion seeds) are a good digestive and contain anti-oxidants, potassium and iron. [11]

Some examples of nutritious herbs and spices are below, try and include them as appropriate:

Herbs - Parsley, Basil, Rosemary, Oregano, Thyme, Sage, Chives, Dill, Coriander, Mint

Spices - Ginger, Turmeric, Black Pepper, Chilli Peppers, Cinnamon, Cloves, Nutmeg

Olive Oil: the only oil that has potential anti-cancer activity. Cold-pressed virgin olive oil contains compounds that may help reduce the risk of 'angiogenesis', i.e. the ability of the cancer to create its own blood vessels. It is also effective in reducing 'oxidative stress'. Olive oil is a good source of Omega-3.

Fermented Foods: bio/live yoghurt – (contains lactobacillus to fight bad bacteria), sourdough bread – (made with fermented dough with naturally occurring lactobacilli/yeast), miso – (a paste made from fermented soyabeans – a good source of copper), tempeh – (fermented soyabeans – good probiotics and high in protein), kimchi – (fermented spiced vegetables e.g. cabbage – high in vitamins A, B, C and lactobacilli) sauerkraut – (fermented cabbage - source of probiotics, fibre and iron), pickled vegetables – (contain probiotics, fibre and vitamins A and K)

Onions and garlic: including spring onions, leeks, shallots and chives. These may be associated with increased protection from potentially carcinogenic compounds, and inhibit the enzymes that can activate those carcinogens. Garlic particularly has phytochemical properties that may reduce the risk of DNA damage that could otherwise cause healthy cells to become cancerous.

Soya: soya (edamame) beans, soy milk and products such as tofu, tempeh, miso, may be associated with increased

inhibition of prostate cancer cell growth, because they contain 'isoflavones' that may influence the hormones, particularly oestrogen, that cancer cells enjoy. Soya also contains Omega-3 healthy fat.

Citrus fruits: mainly oranges, grapefruit (check with your doctor or pharmacist that you aren't taking a medication that can interact with grapefruit), lemons and mandarins, etc. Citrus fruits are another good source of phytochemicals (see Cruciferous green veg) as well as a good natural source of a variety of vitamins, including Vitamin C, which is an anti-oxidant with potential cancer fighting properties.

Peaches and nectarines: possess potential anti-cancer properties and known for thousands of years as beneficial for health.

Foods to LIMIT to moderate consumption

Dairy, What are dairy products?
Dairy products are made from cows' milk, or the milk from other animals like goats or sheep. These include things like milk, cheese, yoghurt, butter and creams. Dairy products are good sources of protein, vitamins and minerals that are important for your health. This includes calcium which is important for strong bones.

Not everyone can eat dairy, and some people choose not to. Dairy alternatives can include products made with soy, oat, almond, and coconut milk. Some dairy alternatives are also good sources of protein and calcium. For example, calcium-fortified soy milk, cheese and yoghurt. These products can be part of a healthy, balanced diet. Try to choose unsweetened products, and products with added calcium and B12. (ref: Cancer Research UK website)

Dairy products and Insulin-like growth factor 1 (IGF-1) and growth hormone (GH) are both involved in tissue growth and development and have in Epidemiological studies reported a positive association between circulating IGF-1 levels and various primary cancers, such as breast, colorectal, and prostate cancer.

Starchy carbohydrates - limit portion sizes – e.g. potatoes (skins on), note: cooked potatoes left to cool will increase the resistant starch associated with improved blood sugar control.

Red meat - beef, lamb, pork – limit to 1-2 small lean portions per week, preferably organic pasture-fed.

Poultry - (eat without skin) chicken, turkey

Eggs

Eggs are a natural source of many **nutrients** including high quality protein, vitamins and minerals. They are naturally rich in vitamin B2 (riboflavin), vitamin B12, vitamin D, selenium and iodine. They also contain vitamin A and a number of other B vitamins including folate, biotin, pantothenic acid and choline, and other essential minerals and trace elements, including phosphorus.

Choline is a nutrient essential to many bodily functions, such as the health of your brain and nervous system. Your body produces this vitamin-like compound in your liver, but not at high enough levels. You need to get the rest of your body's requirements from food. [see box on pg 68]

The richest dietary sources of choline are meat, fish, dairy, and eggs. Many fruits, vegetables, and whole grains contain choline as well, so there are plenty of options for people on vegetarian or plant-based diets.

Prostate cancer cells have high concentrations of choline, which is high in eggs. Research has suggested that eggs have come up as being associated with increased risk of lethal prostate cancer in a cohort of men who did not have prostate cancer. A direct link has not been firmly established (for men with prostate cancer) and there is no strong evidence at this point to suggest the need to completely exclude all food sources of choline from the diet. Choline is a required nutrient, and until we know why, it is recommended to limit whole eggs (including yolks) to an average of 2 per week or less. Almost all of the choline in eggs is contained in the yolk, not in the white. You can reduce choline by using egg whites without the yolks. Eggs and choline in the moderate amounts suggested, against a background diet of moderate animal foods and plentiful plant foods, is likely to have a different effect to a diet with an excessive amount of animal foods and little to no plants.

Choline metabolism is clearly altered in prostate cancer, with greater concentrations of choline-containing compounds in malignant than in normal cells. Because of the selective and high uptake of circulating choline by prostate cancer cells, radio-labelled choline is used to identify prostate cancer recurrence and metastases, and patients with high-grade prostate cancers have higher concentrations of choline-containing compounds than do those with low-grade prostate cancers. **[12]**

Home-cooked cakes or biscuits: make these with less sugar, healthy fats and lower temperature.

Drinks and smoothies

Water - normal tap water may contain many chemicals that filtration by the water company is unable to extract, however it can also include healthy additions and, if you live in a 'hard water' area, beneficial calcium for

bone health too. You could invest in a mains-fed water-purifier, but a portable charcoal filter (e.g. Brita) is less expensive. Drinking plenty of water is important for good health, it helps maintain blood volume, regulates body temperature and helps flush waste.

Juices - juices made at home (fresh carrot, cabbage, apple, celery, pomegranate, etc.) are a way of delivering potential anti-cancer agents into one's body, particularly when digestion of fibre-rich fruit and vegetables is problematic due to cancer symptoms or treatment side effects. To avoid too much sugar (without the fibre found in whole fruits), even from freshly squeezed fruit, mix vegetables and fruit to make the juice, preferably with more vegetables than fruit. If you are able to digest whole fruits, this is preferable to increase the fibre in your diet, which is beneficial for metabolic health and many other bodily processes.

Smoothies – as with juices, best made with vegetables and fruit together, e.g., with kale or spinach, blueberries, banana, and natural yoghurt. Easy to make at home in a blender. Smoothies maintain the fibre content, especially if blended with skins – however we do digest them quicker than whole fruits. Smoothies may be preferable for certain digestive symptoms / side effects. Good tip is to balance fruit with vegetables and protein (oats, nuts and seeds are also good if fibre tolerance / treatment permits)

Probiotic and prebiotic drinks – excellent for the gut and immune system and offer a 'treat' during the day. Probiotics are one or more strains of beneficial bacteria, proven in research to being efficiently delivered to the relevant point in your gut (the 'microbiome') to do their job. Several probiotics come as sweet drinks, yoghurt, or kefir, a fermented 'fizzy' milk drink – rich in probiotic bacteria and a good source of calcium.

Coffee – recent findings support the potential benefits against aggressive prostate cancer, of drinking a moderate amount of coffee each day, e.g., 2 cups, but avoid/minimise sugar, sweeteners or creamer. Caffeine can stay in the body for 6 hours or so, therefore (unless de-caffeinated) coffee/tea is best avoided after mid-afternoon to avoid the risk of impact on sleep.

Cocoa powder – rich in polyphenols, is suitable for hot chocolate drinks, provided unsweetened cocoa powder is used. Also can be used in baking.

Do remember to avoid dehydration. Water, herbal teas, fresh vegetable juices, etc. can contribute to our fluid intake. We should be drinking 2 litres (3.5 pints) of liquid a day, more on hot days.

Cooking and Eating

Oils for salad dressings, and for cooking

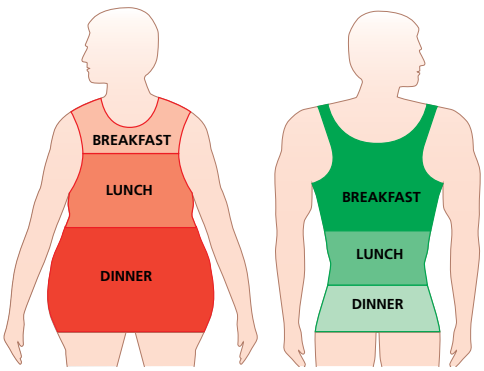
It is quite evident that good quality Extra Virgin Olive Oil (EVOO for short), is a standout healthy nutritious oil that could be described as a 'superfood'. Good quality EVOO can be expensive and, rather like wines, some oils are blended from several sources, whereas 'single estate' ones will have their own unique taste and price point. Be careful what you buy and from whom, otherwise you might not be getting the nutritional benefits you expected. Avoid highly refined 'industrialised' oils, whether olive oil or other types of oil, as the processing can lower the nutritional benefits significantly.

Unless you grew up with EVOO in somewhere like Greece it may take time to adapt to the taste when drizzled over salads! However, EVOO mixed with some balsamic vinegar makes a pleasant tasting salad dressing. Or try EVOO with chillies in for more of a "kick"

When and how to eat and to cook?

It's probably best to avoid eating a full meal later in the evening. The old saying is "Breakfast like a king, Lunch like a prince, Dine like a pauper". Some experts do question this, but if a meal is eaten shortly before bedtime, the energy has nowhere to go apart from building fat. It doesn't just sit quietly in the stomach waiting for tomorrow! Also see 'Fasting' on page 56.

Limiting portion sizes at mealtimes is important, unless



Smoke points of cooking fats, ranked by stability

'Stability refers to the oxidation stability of the oil when heated to high temperatures, and how well it will retain its antioxidant properties. When considering which oil to use, both oxidative stability and polyphenol content play a part. Extra virgin olive oil contains the highest amount of antioxidants, and high oxidative stability, which is why I recommend choosing it for cooking, baking and frying, even at high temperatures.' [see table on Pg 68]

Extract from 'Foods for Life' page 444 by Tim Spector (published 2022).

you need to put on weight! Try using a smaller plate and stop eating before you are completely full (it can take about 20 minutes for the brain to signal your stomach is full). It is easy to overeat so do not have a large helping, and take a break before refilling with extra food. If say, we use marmalade on our breakfast bread or toast, then use a reduced sugar one, spread thinly, avoid piling it high! Having a smaller portion (and not snacking between meals) can help greatly with weight control, hence reducing the risk of cancer and other conditions.

Remember to wash fruit and vegetables and thoroughly cook any meat or poultry before eating.

Golden rule in the kitchen - don't overcook the vegetables! Overcooking can destroy the natural vitamins and minerals, reducing the value of that food to your system. It is recommended to grill rather than fry; steam or stir-fry in preference to boiling.

As much as possible avoid rushed eating. Instead relax at mealtimes and enjoy the food. If we eat slowly and chew our food well it should aid digestion. Mindful eating and social meals with others are also beneficial.

Meal planning – it can help your shopping list preparation if you make a weekly meal plan. What you put in your shopping basket is critical to healthy eating. We do not include any recipes in this booklet, however 'The Doctor's Kitchen' (see Resources pages 61,62), is an interesting cookbook with extensive explanations of how the ingredients in the recipes may benefit health, there are other more recent books in the series. Explore cookbooks to find recipes that fit your own healthy eating pattern.

Variety is important. For instance we mention in Chapter 4 (Grains page 52) the top breakfast cereals recommended by the British Heart Foundation are porridge, muesli (no added sugar) and shredded wheat. Just because porridge is top of their list there is no need to eat it seven days a week, delicious though it may be with some banana and blueberries. For example alternate it with muesli (which usually has nuts and seeds as well as oats), or shredded wheat or poached/scrambled eggs with sliced avocado and wholegrain toast.

For any of your meals there is an incredible choice of ingredients, so try something new each week!

Fasting

Fasting can help with weight loss, maintaining a healthy weight and resting your digestive system. A powerful but simple option is an 'overnight fasting' routine which gives your digestive system and microbiome 14 hours of rest between meals (or at least 13 hours, if you cannot manage 14). We can choose our own time slots but, for example, if we finish our dinner at 7pm, refrain from eating anything again until breakfast at 9am the next day, we then have a 10-hour window for eating. Restrict drinks in the overnight fasting period to water, green or black tea, black coffee. After overnight fasting, exercise or a walk before breakfast can help burn stored body fat.

Or, we might wish to follow a 5:2, or even a 6:1 fasting plan. 5:2 is a weight reducing plan with 5 days normal eating per week and 2 days with lower calorie intake (600 or 800 calories). Whereas 6:1 has only one day a week of lower calorie intake and is more suitable if one just wants to maintain a healthy weight.

> **Note:** firstly check with your GP, oncologist, or dietitian, as applicable, for anything other than extended overnight fasting.

Fasting

The fasting extract below is from 'A Silent Fire' by Shilpa Ravella, pages 256-257

'The sporadic access to food for much of human history - particularly for hunter-gatherers - contrasts with modern habits of feeding and snacking throughout the day and well into the night Fasting may slow ageing and help to prevent or even treat conditions like obesity, hypertension, diabetes, heart disease, cancer, memory issues, bone loss and auto-immune conditions. During a fast the body depletes its supply of glucose and starts to burn fat. Throughout organs and tissues inflammation wanes… but immunity remains intact. Hormones and enzymes that push cells to grow and divide… helpful for growth and development in childhood, are harmful in excess during adulthood, fostering ageing and age-related diseases. They thrive on inflammatory diets high in animal protein but are reined in by plant foods, particularly phytochemicals like polyphenols… The mild stress of a fast shifts the body's attention away from growth and towards repair and reform as it clears or recycles molecular garbage, mends DNA, and renews cells, further dampening inflammation and fortifying the body against a broad range of potential future irritants.'

Snacking

Avoid snacking between meals. (Note: this can vary between individuals, depending on health requirements or preferences. Some people benefit from healthy snacks to avoid blood sugars going too low, particularly if you have lost weight before, during or after cancer treatment, or are struggling to eat normal amounts at mealtimes due to nausea or other digestive symptoms.). If you snack between meals avoid snacks high in fat, sugar or salt.

'Hunger has become an unacceptable sensation in western societies, but it should be embraced, because this is when weight starts falling… Instead of grazing throughout the day, it is best to have a meal and allow it to digest completely before the next one. This also allows the digestive mechanisms to rest before the next meal…

If you do feel distressing hunger pangs, try drinking water, going for a brief walk or occupying yourself with an activity to take your mind off food.' [13]

CHAPTER 6

Vitamins and Minerals (micronutrients)

Vitamins, minerals and supplements*

Note: * before consumption check any supplements with your GP or oncologist, especially if pre or during treatment – there are lots of potential treatment interactions to be careful about.

PCaSO member Mark Giddings writes: "I found in the early days after diagnosis, I was taking some 20 different 'recommended' pills daily. It became all too much and too expensive. Upon detailed research I found that by eating good organic produce, I could give my body the goodness it needed. If you have a healthy, balanced nutritional diet, most vitamins and nutrients your body needs will be delivered by nature. Note however, research now states that your "5-a-day "should now be a minimum of '7-a-day' of which vegetables to fruit should ideally be in ratio of 5:2. Follow this guide and your body will be given the vast majority of nutrients to assist in combatting your cancer".

Vitamins for Bone and Joint Health: after cancer and its treatments, the rate and magnitude of bone and joint problems significantly accelerates. Loss of bone density will lead to osteoporosis and risk of fractures.

Vitamins for Joint Pain: after cancer treatment, osteoarthritis remains the most common form of arthritis, causing pain, stiffness and inflammation within a joint. Studies show that over 50% of patients report joint pains as one of the most troublesome symptoms after cancer.

Turmeric a root emanating from Asia and a member of the ginger family, has been found to profoundly inhibit joint inflammation, often outpacing ibuprofen in its effectiveness. As well as its use in curries, one can mix raw, powdered Turmeric (active ingredient Curcumin) into things like tea, porridge, sauces, etc.,if confirmed as safe by your oncology pharmacist (supplemental turmeric behaves very differently to dietary turmeric, particularly regarding medication and treatment interactions). Note that if the raw powder is mixed with a little olive oil and black ground pepper, its effectiveness increases many-fold. Turmeric also works well with black pepper, root ginger and cumin, e.g. in curries! This is an example of synergy of ingredients for the same recipe, where one or more increases the potential healthy eating impact of another ingredient.

Pomi-T is a whole food 'Polyphenol rich' nutritional supplement usually taken as a capsule containing pomegranate, green tea, turmeric and broccoli. In exhaustive medical trials (in 2013), it is claimed this supplement has proven qualities in reducing PSA, and that in nearly 'half of all men with prostate cancer who use Pomi-T', their cancers had stopped growing or even regressed. Many prostate cancer 'patients/survivors' have taken Pomi-T.

More recently there has been another study for two newly assessed products, see brief information below from the prestigious **ASCO Urology conference** in 2025:

'The better than expected results of the latest national study were presented at the World's biggest prostate cancer symposium in San Francisco by Professor Thomas from Addenbrooke's and Bedford, Cambridge University Hospitals. Men in the trial who were given an upgraded and fortified phytochemical rich supplement (**YourPhyto**) had a 3 fold reduction in PSA doubling time. Also, men randomised to an additional probiotic complex called **YourGutPlus+** had an even greater slowing of PSA, meaning that for most men who took both supplements, the PSA stabilised or reduced. A significantly greater effect than seen 13 years ago from the same research group. What's more, the study also showed a 25% improvement in urinary and erectile function supported by MRI. These remarkable results sets a new standard for dietary research and will empower men to make informed, updated nutritional choices.'

Tumeric a root emanating from Asia and a member of the ginger family, has been found to profoundly inhibit joint inflammation

Calcium evidence now suggests that calcium supplements should only be taken if someone lacks calcium in their diet or to support bisphosphonate therapies (drugs that strengthen bones). Dietary calcium of around 700mg is recommended every day for adults. If you follow a dairy-free diet it does not automatically mean low calcium, as non-dairy milks often have calcium added (check the carton for information).

'In general, adequate calcium intake can usually be achieved by eating one or more portions of these calcium-rich foods every day:

- Dairy or soy milk as a dairy alternative
- Shellfish (oysters, mussels, clams)
- Tinned oily fish with edible bones
- Seaweed and algae
- Leafy green vegetables (broccoli and curly kale)

- Nuts, legumes and seeds
- Dried fruit (apricots and raisins)
- Soybeans, tofu, kidney beans and baked beans' [14]

Vitamin D is essential for everyone, but vitamin D absorption declines with age, so more is needed for the elderly. It helps bones absorb calcium, and is particularly important for men on those hormone treatments that risk bone density loss. Small amounts of vitamin D are found in foods including eggs, oily fish, sun-dried mushrooms, vegetables and nuts. However, the major source of vitamin D is sunlight. Many UK residents can be at risk of vitamin D deficiency, even in summer. Maintaining a sufficient level of Vitamin D may provide some protection against prostate cancer mortality. In UK we probably need a daily higher-strength Vitamin D3 supplement through winter months (Oct-March) and possibly a lower dose one the rest of the year. UCSF recommend 1000-5000 IU's of Vitamin D daily.

Note: testing is recommended before commencing Vitamin D supplementation, to avoid excess doses which may be harmful, or avoid taking doses too low which may be ineffective. See your healthcare provider in first instance, or visit *www.vitamindtest.org.uk*

Vitamin K (K1 and K2) has been found to be important for bone health too. Dietary sources, e.g. leafy dark green vegetables, plus fermented foods and blue-veined cheeses, are nature's way of accessing this vitamin.

Foods for Bone Health after ADT (hormone therapy)

PCaSO member/trustee, Lance Allen, comments - "If you are on long term hormone treatment ask your GP or oncologist to consider a prescribed countermeasure such as Alendronic Acid and calcium supplements. Frequent and varied exercise is also of great benefit in reducing osteopenia and osteoporosis and associated muscle mass loss."

'Multiple prospective studies have examined the relationship between androgen deprivation therapy (ADT) for prostate cancer and bone mineral density (BMD). Bone density reduction is a serious consequence of ADT, with the frequencies of osteopenia and osteoporosis (mild and significant loss of bone density respectively) being directly proportional to treatment duration. Studies suggest that significant bone loss is clearly observed within the first year of ADT.' [15] [see box on pg 70 for FAQ's]

There is further information on Page 51, of PCaSO Knowledge Empowers Prostate Information booklet 'Nutrition Guidance for Patients on Androgen Deprivation Therapy (ADT)'

CHAPTER 7

Tables and Review

Foods for Bone Health after androgen deprivation therapy (ADT)

Nutrient	Dietary Sources	Function
Boron	Apples, avocados, beans, milk, peanuts, peanut butter, pecans, raisins, prunes, potatoes.	Improves calcium absorption. Reduces effects of any Vitamin-D or magnesium deficiency
Calcium	Beans, leafy greens (especially collard greens, bok choy and kale), tofu, almonds, canned fish, dairy products, fortified products such as soya milk and cereals.	Improves calcium absorption. Vitamin D is essential for calcium absorption.
Magnesium	Whole grains, nuts, seed, spinach, most fruits and vegetables.	Important in calcium and potassium uptake.
Phosphorus	Meat, poultry, fish, eggs, milk products, legumes and nuts.	Combines with calcium to strengthen bones.
Potassium	Bananas, strawberries, prunes, tomatoes, potatoes, spinach, beans.	Associated with reduced calcium and phosphorus excretion.
Vitamin D	Cold-water fish and fortified products such as soya milk.	Helps absorb and retain calcium and phosphorus.
Vitamin K	Dark leafy greens, liver, tomatoes, soyabeans, chickpeas. Also produced by intestinal bacteria.	Associated with reduced bone turnover (the natural replacement of bone cells) and reduced urinary calcium excretion.
Zinc	Fish, oysters, chicken, turkey, tofu, whole grains, black-eyed peas, wheat bran and germ.	Important in calcium uptake and immune function.

Tables on Page 58 and 59. Ref: University of California San Francisco (UCSF) Health and Wellness: Living with Prostate Cancer, Part 2: Diet Recommendations.

Examples of plant foods that might fight (prostate) cancer

Allium vegetables Rich in compounds that have anti-cancer properties. They also support gut-health as pre-biotics (foods for good bacteria).	Garlic, Onions, Shallots, Spring onions, Leeks	Consume frequently or daily from this group. Raw onions are particularly good.
Cruciferous vegetables Rich in minerals, vitamins and anti-oxidants, plus other potential anti-cancer properties	Broccoli, Cauliflower, Brussels sprouts Cabbage (incl. bok choi) Greens (spring, mustard) Kale, Watercress, Radish and its leaf	Consume daily from this group
Lycopene-rich fruit and veg Lycopene is an anti-oxidant which combats free radicals. It also has potential anti-cancer properties (inhibits cell proliferation and angiogenesis, increases apoptosis)	Tomatoes (especially if cooked with olive oil), tomato puree Guava, Pink Grapefruit, Watermelon	Consume daily, best absorbed with good fats, e.g. olive oil, avocado, nuts.
Beta-carotene-rich fruit and veg.	Carrots, Sweet potato, Beetroot	
Soy and isoflavones Source of protein, fibre, and B-vitamins. Rich in anti-oxidants.	Soy milk, endamame beans, tofu. Miso, tempeh, natto, soy sauce Peanuts, chickpeas	
Berries	Blackberries, gooseberries, strawberries, cranberries, blueberries, pomegranate seeds, Raspberries	Consume berries daily.
Citrus fruits Rich in vitamin C	Oranges, Lemons	
Wholegrains Contain fibre, which helps digestion	Oats, Barley, Whole wheat, Rice, Quinoa, Freekeh (*an ancient grain*)	Consume frequently or daily from this group. Oats to be either rolled, or steel-cut, but <u>not</u> superfast/creamy ones. Rice - choose brown/basmati.
Seeds	Flaxseed (*also known as Linseed*)	Up to 2 tbsp of *ground* flaxseed daily, e.g. sprinkled onto oats/ cereals. It is a laxative so start gently!
Herbs and spices	Chives, Turmeric (*curcumin*)	
Beta-glucans	Mushrooms	

Nutrition & Prostate Cancer: a review

Nutrition & Prostate Cancer

'A healthy diet may reduce the risk of developing prostate cancer and possibly prevent or delay prostate cancer progression. Good nutrition also reduces the risk of developing other major chronic diseases, such as diabetes, obesity, hypertension and heart disease. It is estimated that one-third of cancer deaths in the United States can be attributed to adult diet and physical activity, including their role in obesity. Scientific evidence suggests that differences in diet and other lifestyle behaviors, such as exercise and smoking, may account for much of the variability in the rates of major chronic diseases across countries, including many cancers.'

University of California San Francisco – "Health and Wellness, Living with Prostate Cancer - Part II: Diet Recommendations",

(*copy and paste the above title into your browser so you can read the complete document including this box and the 2 preceeding tables*)

Healthy Eating (Nutrition and Diet) - Key Points
Avoid highly processed foods, processed meats and charred meat
Avoid sugary drinks, added sugar, sugary foods, e.g. shop-bought cakes, biscuits, sweets
If you drink alcohol, limit it to 1 or 2 small glasses of red wine, with a meal and a glass of water
Limit your portion sizes. If you snack between meals avoid snacks high in fat, sugar or salt
Feed your gut microbiome with prebiotics, also kefir or bio-yoghurt probiotics*
Eat enough dietary fibre, 30g each day
Follow a long-term dietary pattern that works for you, e.g. the Mediterranean diet
Eat 30 different plant foods each week; include a 'rainbow' of fruit and vegetables
Eat enough polyphenol-rich foods
Where you can, choose whole foods and home-cooked meals
Only consume moderate amounts of dairy (low-fat milk, butter, cheese). Limit eggs
Choose healthy oils for cooking and salad dressings
Eat protein with every meal [1.0-1.5 g/kg body weight/day], include some plant protein daily
Consume more healthy omega-3 fats, e.g. nuts and oily fish
Eat foods for bone health, even more so if on ADT (hormone treatment). See Tables.
Green Tea helps fight cancer, as does Coffee. Avoid caffeine 6-7 hours before sleep
Drink plenty of water. We need about 2 litres of fluids per day, more on hot days
Try overnight fasting, e.g. 14 hours without eating
* Unless you are on chemotherapy or have low white blood cells for other reasons. If so, check with your treatment team before consuming probiotic foods. Prebiotic foods are safe at all times, unless you are on a fibre restricted diet due to your treatment.

FOOTNOTES

Section 1

[1] *Ref. Prof. Robert Thomas, How to Live' p.81.*
[2] *Ref. Prof. Robert Thomas, How to Live' p.49, p55.*
[3] *Cohen/Jefferies, Anticancer Living, p.242'.*
[4] *Ref. Prof. Robert Thomas, How to Live' p.107.*
[5] *For more details see 'Physical Activity and Exercise' in Section 2 of this booklet*
[6] *See 'Prof. Robert Thomas, How to Live, p.238, about the dangers of long-term supplementation.*
[7] *For more information see Synergy and the Mix of Six, in the book 'Cohen/Jefferies, Anticancer Living.*
[8] *New Scientist Essential Guide No. 18 'Ageing', p75.*
[9] *[New Scientist Essential Guide No. 18 'Ageing', p86.]*
[10] *[book 'Exercised' by D. Lieberman, p246/7]*
[11] *[New Scientist Essential Guide No. 18 'Ageing', p77-79]*
[12] *The mental powers of super-agers, Sept. 2022, Mathew Solan, Harvard Men's Health Watch, see link https://www.health.harvard.edu/mind-and-mood/the-mental-powers-of-super-agers*

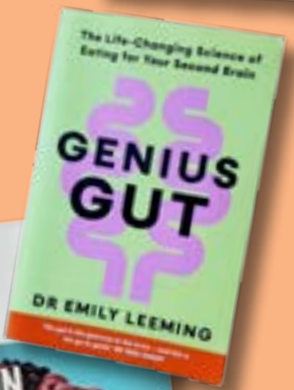
Section 2

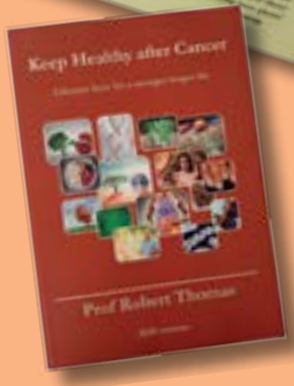
[1] *(Ed. note: Dr Daniel E Lieberman is head of the Department of Human Evolutionary Biology at Harvard University and author of several books).*
[2] *[Extracts above from EXERCISE - New Scientist Essential Guide, pages 9 and 10]*
[3] *[Above extract is from the World Health Organization,'Physical Activity' 5 Oct 2022, at https://www.who.int/news-room/fact-sheets/detail/physical-activity*
[4] *(Ed. note: whilst acknowledging that some people may have unavoidable mobility challenges).*
[5] *(Ed. note: some people choose to use a stand-up adjustable height desk and/or an under desk treadmill to counter long hours at a computer, for instance).*
[6] *['Research findings' and 'Exercise at any age' extracts above are from EXERCISE - New Scientist Essential Guide, pages 16, 18, 19]*
[7] *[Extracts above are from the transcript of ZOE podcast featuring Dr Claire Steves 'How to maximise health in your later years' 16 Feb 2023. Dr. Claire Steves is a professor at King's College London, a medical doctor, and the clinical director at TwinsUK. Claire's research focuses on better understanding how ageing works and what we can do about it.]*
[8] *[Extracts above are from EXERCISE - New Scientist Essential Guide, pages 27-29]*
[9] *[From the book 'Exercised', by Daniel Lieberman, page 297]*
[10] *[Extracts above are from EXERCISE - New Scientist Essential Guide, page 31]*
[11] *[Extracts above are from EXERCISE - New Scientist Essential Guide, pages 50-55]*
[12] *[From the book 'Exercised' by Daniel Lieberman, pages 293-294]*
[13] *[Extracts above are from EXERCISE - New Scientist Essential Guide, pages 24-25]*
[14] *From UCSF, Health and Wellness, Living with Prostate Cancer – Exercise Recommendations, p.6 – https://urology.ucsf.edu/sites/urology.ucsf.edu/files/uploaded-files/basic-page/exercise-recommendations-pamphlet.pdf*
[15] *Extracts from Prostate Cancer Foundation April 29 2024, Part3, 'Exercise is the Turbo Boost to a Healthy Prostate'. Janet Farrar Worthington talks with PCF-funded epidemiologist June Chan, Sc.D., about what a healthy heart has to do with preventing or slowing down prostate cancer.*

Section 3

[1] Cohen/Jeffries, Anticancer Living, p. 146.
[2] Cohen/Jeffries 'Anticancer Living', p226.
[3] Prof. Robert Thomas, How to Live pp 69-70 and 75-76
[4] Extracts above are from diabetes.co.uk 'Trans fats'
[5] ref: WCRF – summary of the Third Expert Report.
[6] Prof. Robert Thomas, How to Live p.55
[7] Prof. Robert Thomas, How to Live' p.81
[8] 'See How to Live by Professor Robert Thomas pp, 140, 197 and 248.}
[9] The above extracts are from 'Living without inflammation' January 2023
[10] The above extracts are from 'A Silent Fire- the story of inflammation, diet and disease' pages 159-160, by Shilpa Ravella
[11] The above extracts are from 'Living without inflammation' January 2023
[12] Apolo AB, Pandit-Taskar N, Morris MJ. Novel tracers and their development for the imaging of metastatic prostate cancer.
[13] 'See 'How to Live' by Professor Robert Thomas p.100.
[14] 'See 'How to Live' by Professor Robert Thomas pp 229, 230
[15] Ref: University of California San Francisco (UCSF) Health and Wellness: Living with Prostate Cancer, Part 2: Diet Recommendations p.22.

RESOURCES





Acknowledgements

Glossary of Terms

Abbreviations

Other Sources

Resources

Information and inspiration

In preparing this Healthy Living booklet (*2nd edition 2025*) many sources of information were accessed, to inform the background and content, along with the personal experiences and knowledge of members of PCaSO as patients/survivors of prostate cancer. In a number of cases within the booklet specific quotes are made and the source identified within the text, of each section or as 'footnotes' on inside back cover.

Some of the main sources accessed are listed below and we recommend them for further reading or viewing, for they contain much more information, should you wish to know more. They were inspirational and we acknowledge their contribution to furthering knowledge for cancer patients and for the prevention of cancer and for healthier living. Not all sources agree in all aspects, for much of the science is still developing in what are in many cases complex matters. Some information in books can go out of date and some of the online sources may be either updated, or not always continue to be available.

If you are reading the printed version of this booklet and wish to access online sources referenced, we recommend you use the online, interactive, version on the PCaSO website and click on the links that you wish to view.

NOTE: The first edition was published in October 2022 and much of it's content has been retained within the 2nd edition.

Books:

Professor Robert Thomas – Keep Healthy after Cancer. *By Health Education Publications, 2020*

Professor Robert Thomas – How to Live. *Published by Short Books, 2020.*

Dr Lorenzo Cohen and Alison Jeffries - Anticancer Living - the six-step solution to transform your health. *Published by Vermilion, 2018*

Dr Rupy Aujla - The Doctor's Kitchen – Supercharge your Health with 100 Delicious Everyday Recipes – *Harper Collins Publishers 2017 (Informative about health and ingredients for the first 60 pages)*

Daniel Lieberman – Exercised – the science of physical activity, rest and health. Allen Lane publishers 2020

Shilpa Ravella – A Silent Fire – The Story of Inflammation, Diet and Disease. *The Bodley Head publishers 2023*

Rhiannon Lambert – The Science of Plant-based Nutrition. *Dorling Kindersley publishers 2024*

Dr Emily Leeming – Genius Gut – The Life-changing Science of Eating for your Second Brain. *Penguin Random House UK publishers 2024*

Tim Spector – Food for Life – The New Science of Eating Well. *Penguin Random House UK publishers 2022*

Living Without Inflammation – Tips and tricks for a healthy Lifestyle. *Bonnier Publications International AS, Norway. 2023*

Dan Buettner - Blue Zones – The Science of Living Longer. *National Geographic publishers 2021*

New Scientist Essential Guides:

No. 9. Nutrition & Diet – the Real Science of Better Eating. *Published 2021*

No.16 . Exercise – The Real Science of Physical Fitness. *Published 2023*

No. 18. Ageing – The Secrets to a Long and Healthy Life. *Published 2023*

No. 25. Better You – The Science-backed Secrets to a Healthy Mind and Body. *Published 2024*

Websites:

World Cancer Research Fund and American Institute of Cancer Research – i) summary of the Third Annual Report 2018 'Diet, Nutrition, Physical Activity and Cancer', also ii) The Cancer Process, and iii) Energy balance and body fatness

https://www.wcrf.org/wp-content/uploads/2024/11/Summary-of-Third-Expert-Report-2018.pdf

https://www.wcrf.org/wp-content/uploads/2024/11/The-cancer-process.pdf

https://www.wcrf.org/wp-content/uploads/2024/10/Energy-Balance-and-Body-Fatness.pdf

Prostate Cancer Foundation U.S.A – The Science of Living Well, Beyond Cancer

https://www.pcf.org/the-science-of-living-well-beyond-cancer/

University of California San Francisco – Living with Prostate Cancer – Diet recommendations.
https://urology.ucsf.edu/sites/default/files/uploaded-files/attachments/p8-ii-diet_guide_web_05232018.pdf

NHS alcohol units - *https://www.nhs.uk/live-well/alcohol-advice/calculating-alcohol-units/*

Meditation – *https://www.headspace.com*

Mindfulness – *https://www.mindful.org*

Visualisation – *https://www.betterhelp.com/advice/search/?search=visualization*

Videos

on the PCaSO website: *www.pcaso.org/videos-2/*

Nicky Robinson, Penny Brohn UK – Eating Well with Prostate Cancer – Exploring the Role of Diet and Nutrition

https://pcaso.org/video-diet-and-nutrition-nicky-robinson/

Keeping Active through and beyond prostate cancer – Rosie Sadler, Brighter Outlook

https://pcaso.org/video-keeping-active-through-beyond-prostate-cancer

Further links for Physical Activity and Exercise

NHS exercise *www.nhs.uk/live-well/exercise/*

British Heart Foundation exercises *www.bhf.org.uk/*

Walking / hiking *https://www.ramblers.org.uk/*

Nordic Walking *https://britishnordicwalking.org.uk/blogs/news/get-started-with-nordic-walking-for-better-health?*

How to start running *www.nhs.uk/live-well/exercise/get-running-with-couch-to-5k/*

Park Run *www.parkrun.org.uk*

Prostate Cancer UK –
Diet, physical activity and your risk of prostate cancer : *https://shop.prostatecanceruk.org/diet-physical-activity-and-your-risk-of-prostate-cancer?search=DRK*

Diet and physical activity for men with prostate cancer : *https://prostatecanceruk.org/prostate-information-and-support/living-with-prostate-cancer/physical-activity-and-prostate-cancer*

Cancer Research UK *www.cancerresearchuk.org/about-cancer/coping/physically/exercise-guidelines*

Yoga *www.bwy.org.uk/*

Tai-Chi *www.taichiforhealthinstitute.org/what-is-tai-chi/*

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All other images contributed by members of PCaSO

Glossary of Terms

Acrylamide – Potentially carcinogenic compounds caused by heating starchy food above 120C (but not by boiling).

Active Surveillance – A programme of health checks for men with slow-growing tumours.

Adipose tissue – body fat, subcutaneous (under skin) or visceral (around organs in abdomen).

Androgen Deprivation Therapy (ADT) – Medium/ long term hormone treatment that reduces the production of testosterone in the body.

Angiogenesis – The ability of cancers to create new blood vessels to nourish the cancer.

Antioxidant – A substance that protects us from the dangerous 'free radicals'.

Apoptosis – The natural death of cells at the end of their life cycle.

B-cells – Cells that create antibodies to neutralise pathogens and toxins.

Brachytherapy – radiotherapy internal to the body, e.g. source placed within the prostate gland.

Circadian rhythm – The body's natural 24-hour clock at physical, mental and behavioural levels.

Cognitive reserve – spare mental capacity.

Cortisol – A stress-related hormone produced by the adrenal glands.

C-Reactive Protein – blood test that is an indicator of inflammation levels in the body.

Cytokines – 'Messenger' molecules helping the immune system to respond to invasive threats.

Dysbiosis – an imbalance of gut bacteria.

Endorphins – Compounds created in the body to reduce pain intensity, and also create a 'feel good' factor after exercise.

Fatty acids – Natural animal or vegetable fats that may be saturated or unsaturated.

Free radicals – Rogue molecules within cells, that can cause damage to DNA.

Immunotherapy – Treatment to help the immune system to recognise and attack cancer cells.

Inflammation – Chronic inflammation can hinder the immune system's effectiveness.

Insulin-like Growth Factor -1 – A natural growth hormone in meat and dairy products, that can help encourage cancer cell development.

Lycopene – potent anti-oxidant found in tomatoes, particularly if cooked.

Lymphatic System – part of the immune system that drains lymph and prevents infection.

Lymph nodes – Small organs (nodes within the lymphatic system) that filter and destroy harmful bacteria and viruses.

Macrophages – The 'big eaters' of the immune system, which engulf harmful cells.

Metabolic health – how the body processes fats and sugars.

Metastasis – The spread of cancer outside the primary site, e.g. prostate cancer spreading to bones or lymph glands.

Microbiome – The Gut microbiome is the community of micro-organisms that naturally inhabit the digestive system.

Oncologist – a specialist in the medical treatment of cancer

Osteoporosis – significant loss of bone density.

Oxidative stress – An imbalance that inhibits the body's ability to de-toxify, and to repair damage.

Pathogens - toxins, invading viruses and bacteria.

Phytochemicals – Natural chemicals in many fruits and vegetables, with a range of benefits including immunity response and reduced chronic inflammation.

Polyphenols – Powerful natural anti-oxidants linked to a range of health benefits including anti-cancer properties.

Prebiotics – A source of food for the gut's healthy bacteria.

Probiotics – Good bacteria/yeasts that live in the gut microbiome

Prostate Specific Antigen (PSA) – A 'marker', identified by blood test, that indicates a health issue within the prostate gland.

Resveratrol – A compound found in the skins of grapes, blueberries, raspberries, also in peanuts.

T-cells – A white blood cell with a central role in the immune system.

Visceral Fat – Toxic abdominal fat that builds up around the organs.

Vagus nerve – nervous system connecting vital organs of the body, e.g. brain, heart, gut, liver.

Watchful Waiting – Similar to Active Surveillance but with a lower level of monitoring.

Abbreviations

ADT	Androgen Deprivation Therapy (formerly known as Hormone Therapy)
BDA	British Dietetic Association (The Association of UK Dietitians)
BHF	British Heart Foundation
BMD	Bone Mineral Density
BMI	Body Mass Index
BRCA2	a gene that corrects DNA damage. Inheriting a variant (faulty) BRCA2 gene means a greater risk of breast, ovarian or prostate cancer, as it cannot repair damaged cells
CNS	Cancer Nurse Specialist
CRPC	Castration-Resistant Prostate Cancer
DEXA	Scan for bone mineral density, using two X-ray beams
DNA	Deoxyribonucleic Acid
EGCG	Epigallocatechin Gallate
EVOO	Extra Virgin Olive Oil
FMT	Faecal Microbiota Transplant
GI	Glycaemic Index
HDL	High Density Lipoprotein
HPV	Human Papillomavirus
IGF-1	Insulin-like Growth Factor-1
LDL	Low Density Lipoprotein
mpMRI	multi-parametric Magnetic Resonance Imaging
mRNA	messenger Ribonucleic Acid. Single-stranded mRNA codes for proteins from DNA
PCF	Prostate Cancer Foundation (based in USA)
PET Scan	Positron Emission Tomography scan
PNI	Psychoneuroimmunology (study of connections between mind, nervous system and immune system)
Pomi-T	Brand name of dietary supplement designed to reduce PSA levels (contains pomegranate, green tea, broccoli and turmeric)
PSA	Prostate Specific Antigen
PSMA	Prostate Specific Membrane Antigen – a protein on the surface of prostate cancer cells
PUFA	Polyunsaturated Fat
SNP	Single nucleotide polymorphism. (A single variation of one of the four nucleotide bases of DNA – A, C, G, or T)
THR	Target Heart Rate
TRX	Brand name of resistance training equipment
UCSF	University of California San Fransisco
UV	Ultra Violet rays (from sunshine)
VEGF	Vascular Endothelial Growth Factor
WCRF	World Cancer Research Fund
WFA	Walking Football Association
WHO	World Health Organisation

Other Sources of Support and Information

National Federation of Prostate Cancer Support Groups (Tackle)	0800 035 5302	www.tackleprostate.org
Prostate Cancer UK	0800 074 8383	www.prostatecanceruk.org
Macmillan Cancer Support	0808 808 0000	www.macmillan.org.uk
Cancer Research UK	0808 800 4040	www.cancerresearchuk.org
Penny Brohn UK	0303 3000 118	www.pennybrohn.org.uk
Maggie's Centres (*Royal Marsden Hospital, Sutton. and University Hospital, Southampton*)	0300 123 1801	www.maggies.org

Healthy Living Appendices

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Foods that contain Choline 68

Smoke points of cooking fats, ranked by stability 68

How cancer occurs and develops 69

Nutrition Guidance for Patients on Androgen Deprivation Therapy (ADT)

The table below provides examples of common questions received and answers provided by the UCSF Helen Diller Comprehensive Cancer Centre's dietitian Greta Macaire. Addition of a dietary assessment at ADT initiation to mitigate symptoms and treatment side effects is warranted. Data suggest that only a small proportion of patients on ADT receive advice on nutrition and physical activity, while >80% of patients would make use of such advice if it were provided.

Reference: European Urology Focus (2023) Nutrition Guidance for Patients on ADT

Common patient questions and answers for men on ADT

How can I lower my risk for osteoporosis through diet?

- Eat plenty of vegetables, fruits, beans, nuts, seeds, and lean proteins to provide essential nutrients for bone health.
- Consume 1000–1200 mg of calcium daily through food sources (dark leafy greens, canned fish with soft bones, non- or low-fat dairy products, chia seeds, almonds, and fortified foods and beverages); include a supplement if unable to meet needs through diet alone.
- To optimize calcium absorption, take a daily vitamin D3 supplement of 800–1000 IU or more if blood levels are low.

How do I minimize weight gain while on ADT?

- Eat fibre-rich foods; dietary fibre helps you feel full with fewer calories, aiding in weight management.
- Check that at least half of your plate is filled with vegetables and fruit, a quarter with lean protein (poultry without skin, fish, beans, soy foods), and up to a quarter with starchy vegetables (sweet potatoes, winter squash, corn) or whole grains.
- Limit or eliminate sources of empty calories, including alcohol, sugar-sweetened beverages, "fast foods", and other processed foods that are high in added fats, starches, salt, or added sugars.

Do you recommend supplements while on ADT?

- Owing to a lack of evidence of benefit, and in some cases links to an increase in cancer progression, dietary supplements are not broadly recommended.
- Always check with your oncologist and oncology pharmacist for any treatment or medication interactions before starting a supplement.
- It is best to meet nutrient needs through diet alone when possible.

What about alcohol?

- Studies on the link between moderate intake of alcohol and the risk of heart disease are conflicting, with some studies finding protective effects and others suggesting that any amount of alcohol raises risk.
- If you do not drink alcohol, do not start; if you choose to drink alcohol, limit your intake to one to two drinks per day.
- One drink is equivalent to 12 ounces of beer, 5 ounces of wine, or 1.5 ounces of distilled spirits.

Do you recommend a plant-based diet and what does that mean?

- Eating a plant-based diet is recommended because of its association with better heart health, healthier body weight, lower risk of diabetes, and lower risk of death from any cause.
- A plant-based diet means most of what you eat comes from plant foods: vegetables, fruits, beans, nuts, seeds, and whole grains. You can still consume meat, dairy, eggs, fish, and other seafood, but this makes up a small proportion of your total food intake.
- If adopting this type of diet, good sources of protein such as beans, soy foods, nuts, and seeds should be eaten with each meal; a vitamin B12 supplement or fortified food source is necessary for vegan diets.

Summary (relates to chapter 4)

Foods and drinks to AVOID, as much as possible:

- highly processed food, food cooked in fat, ready meals containing sugar, etc.
- processed meats
- charred food, crisps and the like manufactured at high temperatures
- shop-bought cakes/muffins, biscuits, sweets and chocolates
- white bread, white rice and white pasta; sugary cereals
- refined sugar, syrups or sugary drinks of any kind (e.g. colas, or fancy coffees loaded with sugar)
- fruit juices (as it is better to eat whole fruits)
- alcohol (but if you do drink, just 1 or 2 small glasses of red wine)

Foods and drinks to LIMIT to moderate amounts:

- potatoes (up to 3 times per week. Preferably new potatoes, rather than roast or mash)
- red meat (1-2 times per week), preferably organic, grass pasture-fed
- poultry (skinless) e.g. chicken, turkey
- home-cooked cakes, biscuits, etc. (with less sugar, healthy fats and lower temperature 150C)
- good quality dark chocolate (a few small squares, 70% +)
- mixed fruit/vegetable juices
- coffee (2 or 3 cups per day)

Foods and drinks to consume in (sensible) abundance:

- seafood, crab, prawns, mussels
- fish, (also oily fish at least 2 times a week)
- a 'rainbow' variety of fresh fruit and vegetables
- seeds - chia, pumpkin, sunflower, flaxseed (linseed)
- whole grains - quinoa, oats, spelt, rye, barley, whole wild rice, wholewheat pasta, sourdough and wholegrain bread
- nuts, beans, lentils, brown rice, peas, mushrooms
- herbs - parsley, rosemary, mint, thyme, chives
- spicy foods, and spices - chilli, ginger, turmeric, cinnamon, cardamom, cacao powder
- water, green tea, vegetable juices

Foods that contain choline (Relates to p54 Eggs...)

Meat, fish, and poultry: Beef, chicken, fish, and beef liver are all rich sources of choline

Eggs: A large egg contains about 25% of the daily recommended amount of choline

Dairy: Milk and yogurt contain choline

Vegetables: Cruciferous vegetables like broccoli, cauliflower, and Brussels sprouts contain choline

Legumes: Beans and peanuts contain choline

Nuts and seeds: Sunflower seeds contain choline

Whole grains: Contain choline

Smoke points of cooking fats, ranked by stability (Relates to p55)

'Stability refers to the oxidation stability of the oil when heated to high temperatures, and how well it will retain its antioxidant properties. When considering which oil to use, both oxidative stability and polyphenol content play a part. Extra virgin olive oil contains the highest amount of antioxidants, and high oxidative stability, which is why I recommend choosing it for cooking, baking and frying, even at high temperatures.'

Type	Smoke point degrees C	Oxidative stability	Polyphenols mg/100g	Type	Smoke point degrees C	Oxidative stability	Polyphenols mg/100g
Coconut oil	175-200	*****	0	Ghee	245-255	**	0
Peanut oil	225-235	****	0	Rapeseed oil	190-230	**	3
Extra virgin olive oil	170-207	****	60	Walnut oil	160	**	8
				Avocado oil	270-300	*	6
Virgin olive oil	205-215	****	35	Butter	150-175	*	0
Olive oil	195-245	***	20	Sesame oil	175-210	*	2
Grapeseed oil	185-205	**	2	Flaxseed oil	107	*	5
Sunflower oil	220-240	**	1				

The table and note 'Smoke points of cooking fats, ranked by stability' above are extracts from page 444 of 'Foods for Life' by Tim Spector (published 2022).

How cancer occurs and develops

This Section is primarily for those (prostate) cancer patients and survivors who are curious about the science and who want an insight into how cancer, a disease of our cells, develops over time. If you are not curious, or have not been diagnosed with prostate cancer, then we suggest you skip this section.

How Cancer can develop

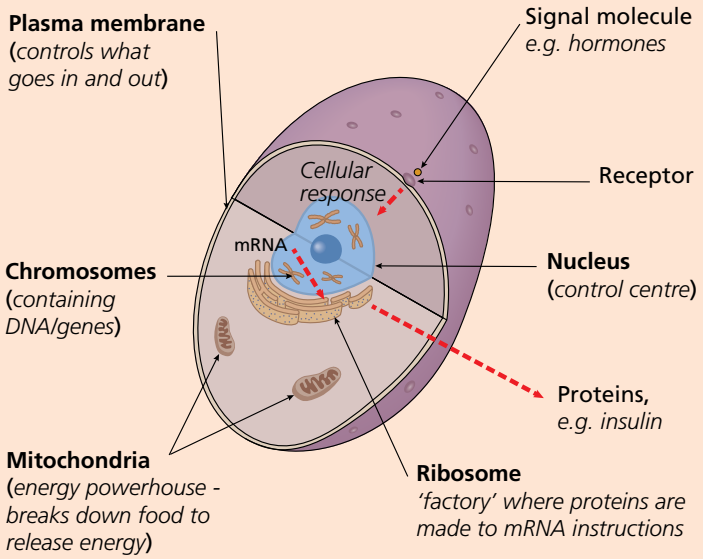
'To understand how cancer develops, it is important to know first how cells function and how the body develops and functions normally'

[World Cancer Research Fund, 'The Cancer Process']

The normal Cell

Cells are microscopic in size but they are complex. We humans are 'multi-cellular', meaning that most cells work together in a scaffolding framework to form molecules, tissues and organs of the body. The outside envelope of the cell is called the *Plasma Membrane* which acts as a barrier and controls what comes in and what goes out. The *Nucleus* is inside and acts as the control centre, it includes *chromosomes* which contain our DNA and its genes. DNA can be considered a 'blueprint' for *gene expression*, which controls the manufacturing process within the cell *Ribosome*, creating amino acids to form specified proteins to be sent outside of the cell. The *Mitochondria* are also important as the 'energy powerhouse', breaking down food to release cellular energy (ATP); as a result of this process potentially damaging 'free radicals' are generated, but they are normally kept in balance. There are *Receptors* on the surface of the plasma membrane that detect chemical signals in the bloodstream and transmit these signals to the interior of the cell. See the simplified diagram on page 55.

Basic structure of a normal cell
(*many items omitted for simplification*)



DNA is our complete 'blueprint' or 'genetic code', that remains protected within the nucleus.

When a signal molecule request to make a protein is received, the specific code (gene) required is copied from DNA to mRNA (by transcription), to then travel out of the nucleus to build amino acids (by translation) which will form the specified protein in the ribosome.

The protein is then sent to wherever in the body is specified

Normal Cell Cycle

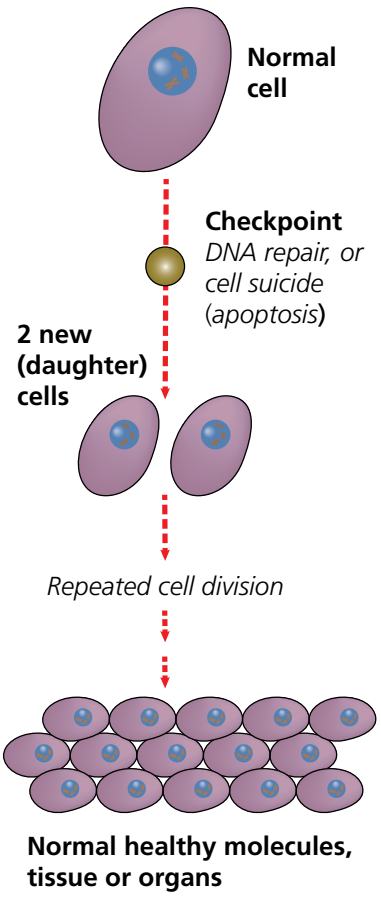
New cells are continually being created in the body by the process of cell division, so as to:

- enable growth from birth to adult
- heal wounds
- replace old cells.

There are over 200 types of cells, they each replicate at different speeds, e.g. skin cells and gut cells are replaced very quickly, but some other cells, like nerve and brain cells, take much longer, and some cells are never naturally replaced in adults.

Normally everything about cells is completely controlled with each cell having its own DNA instructions for doing its specific 'job', also instructions for when **to divide** and when **to stop dividing**. The cell division process firstly requires the DNA in the cell to be replicated. Normal progression is monitored at **checkpoints** that sense errors, allowing repair of any defects e.g. DNA damage, before the cells are allowed to divide into two identical (daughter) cells.

Normal cell division



For approximately the first quarter of our lives we are growing, from an embryo, through childhood and then to a fully grown adult. Once we are fully grown the growth signals that are generated from our DNA are mostly switched off, but are **not** deleted from the DNA in our cells (this has implications, as developing cancer can turn them on again for its own purposes).

Causes of transformation into cancer cells

See diagram opposite

Most cancers start when a normal cell in the body goes wrong.

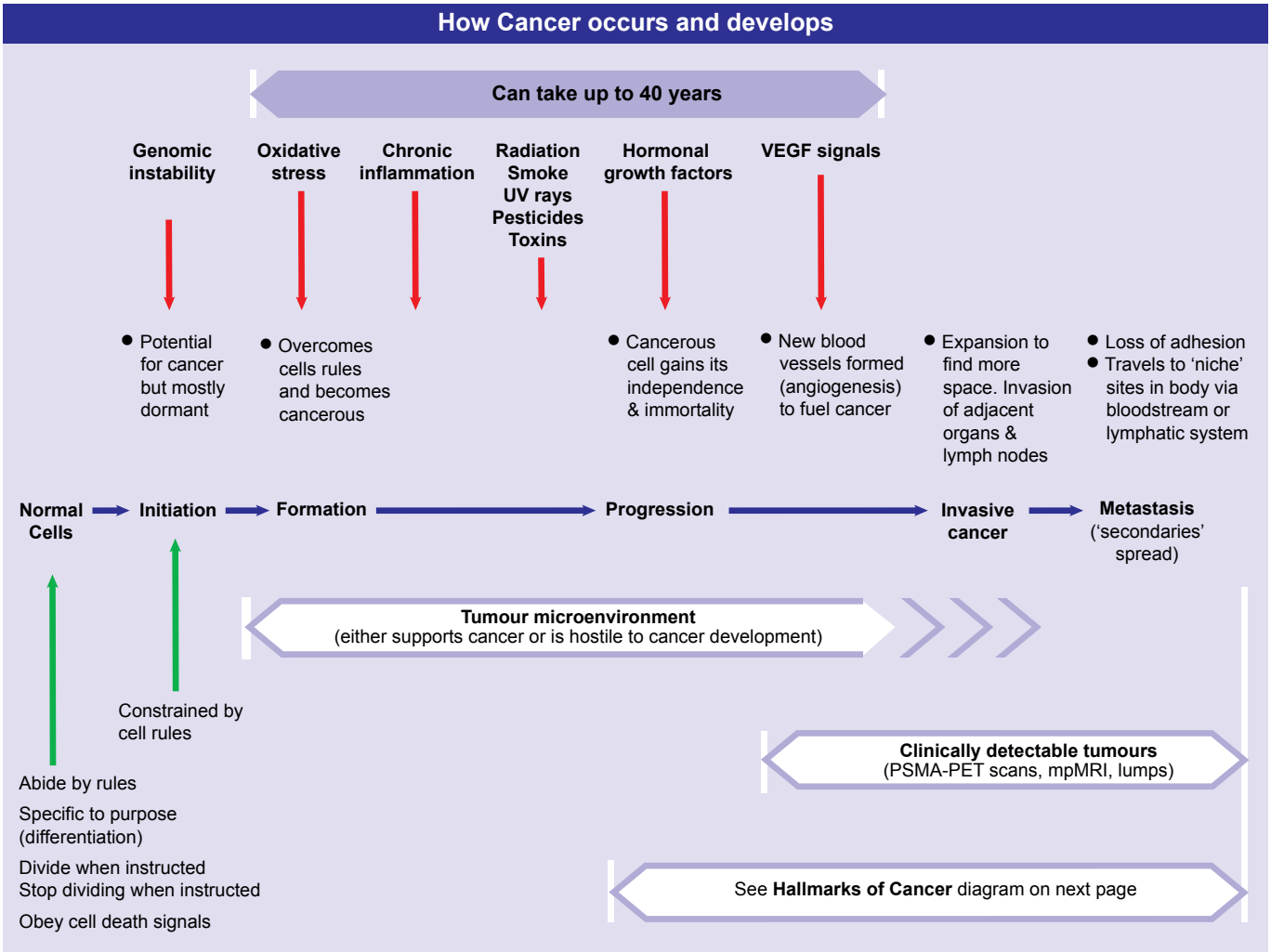
There are several reasons why normal cells might be triggered (*initiated*) to develop into pre-cancerous cells (i.e. not yet deemed cancerous):

- natural cell replication – (errors from the copying of billions of DNA instructions. It is these errors that may contribute to ageing)
- environmental influences (e.g. smoking, alcohol, toxins and UV rays can damage DNA)
- genetic inheritance (either specific genes, such as damaged BRCA2, or cumulative small SNP's i.e. mutation of one of the DNA bases)
- viruses (for some cancers, e.g. the HPV virus can cause cervical cancer)

A number of factors influence the development of cancer which can result in the unpicking of all the rules governing growth in the cancerous cell, so the cancer cell can replicate indefinitely and keep growing. The 'tumour microenvironment' can also cause further loosening of the rules so that the cancer cells gain their independence and are no longer respecting the rules imposed on normal cells. This independence means cancer cells are concentrating on their own survival and growth rather than that of the body as a whole.

A cell that becomes cancerous does not care about its 'job' and:

- ignores signals to stop dividing and thus avoids normal cell death
- replicates indefinitely and uncontrollably and can form clumps of cells that become a 'lump' or tumour
- avoids destruction by the immune system and can also 'hijack' the immune system to increase growth of the cancer
- needs more energy so will seek out blood vessels to supply more oxygen and nutrients to feed itself (*angiogenesis*)



- can extend from the original organ to other nearby parts of the body (*invasion*), or travel via the blood or the lymphatic system to more distant parts of the body (*metastasis*). Wherever it ends up it is still cancer from the original organ, e.g. in the case of prostate cancer it can locally invade the lymph nodes, or travel to and colonise the bones, where it is still prostate cancer, not bone cancer.

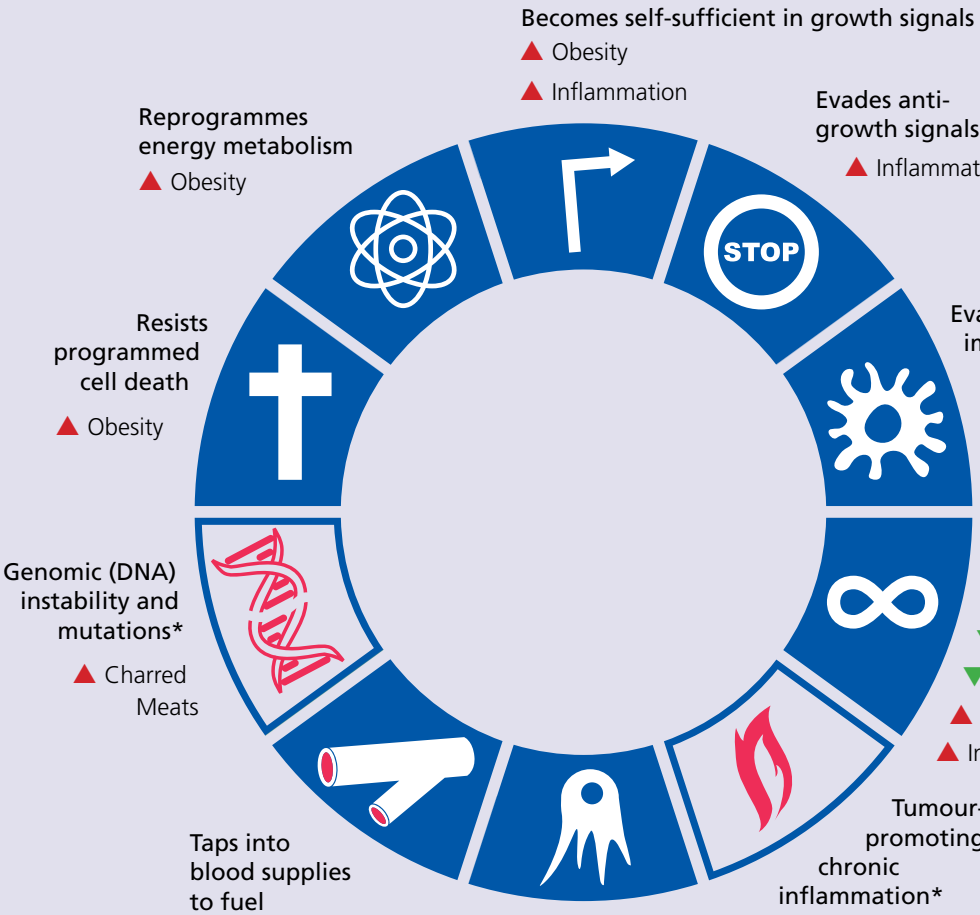
What defines a cancer cell?

In 2000, two researchers, Douglas Hanahan and Robert Weinberg, wrote a paper about the six genetic processes they believed made cancer happen. They called these 'Hallmarks of Cancer' and they added two more to this several years later, and two 'enabling processes', making ten in all. See a diagram below, simplified into 'plain English', rather than the scientific jargon! [*Should you want far more detailed descriptions, see Appendix A of the book 'Anti-Cancer Living' by Dr Lorenzo Cohen and Alison Jeffries, or read online 'The cancer process', by the World Cancer Research Fund*].

Hallmarks of Cancer as Influenced by Lifestyle Factors

The simplified diagram below shows eight typical characteristics of cancer (of which there are many types) and two fundamental enabling factors of cancer. The diagram also indicates where lifestyle can impact these hallmarks and enabling factors in either positive or negative ways.

"**A wide range of factors related to diet, nutrition and physical activity can influence the processes represented by the hallmarks of cancer**" (WCRF 2018 'The Cancer Process').



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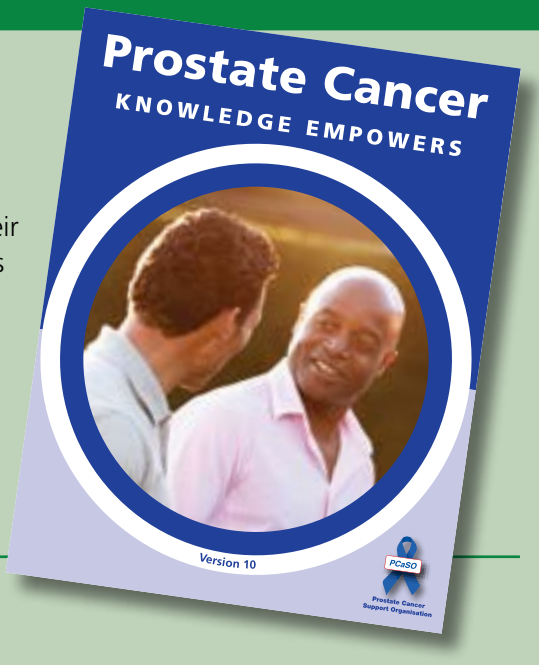


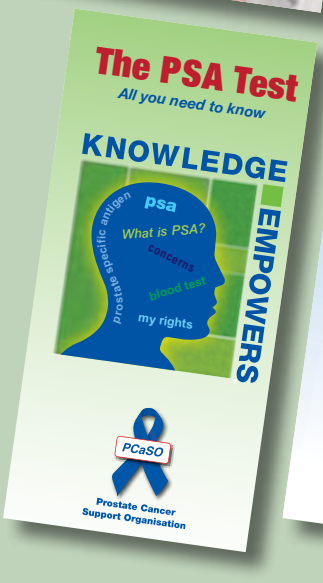
KNOWLEDGE EMPOWERS

This prostate cancer information booklet sets out to provide a comprehensive guide, from a patient's perspective, to most aspects of prostate cancer. It aims to help men diagnosed with the disease (and their partners, friends and family) to understand about prostate cancer and its effects in order to have sufficient knowledge to give them confidence when talking to GPs, hospital consultants and specialist nurses. It is available to view or download at our website **www.pcaso.org**

If you would like a free printed copy of the booklet sent to you by post, please email: info@pcaso.org

Information Leaflets

A series of information leaflets to guide the reader through different aspects of Prostate Cancer. Available in print and online



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Patient Stories

Some men diagnosed with different stages of Prostate Cancer and then having various treatments wanted to share their stories and encourage others to get tested as early as possible. Read their stories and find out why you should have a PSA test: **https://pcaso.org/patient-stories/** or go to pcaso.org then to Information and select Patient Stories

PCaSO Videos

Here we bring together Videos about PCaSO, Prostate Cancer, and recordings of meetings or presentations that we believe will be of interest.

https://pcaso.org/videos-2 or go to pcaso.org then to Information and select Videos

Contact information

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Prostate Cancer Support Organisation

A patient support organisation primarily covering Dorset, Hampshire and Sussex areas offering a free and confidential service

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