

**An Introduction to**

# Health DEFENCE

**Dr Paul Clayton**



**How you can combine  
the most protective nutrients  
from the world's healthiest diets to  
slow ageing and achieve optimum health**

# Your own copy of *Health Defence* plus a FREE Cookbook



We hope you will enjoy reading this *Introduction to Health Defence*. If so we feel sure that you will want to read the book itself.

*Health Defence* contains a wealth of vital information including chapters on the specific nutrients that help protect you from:

- Cancer
- Osteoporosis
- Diabetes
- Asthma
- Heart Disease
- Stroke
- Alzheimer's
- Skin ageing

The book ends with specific recommendations on the most protective foods to incorporate into your diet and the optimum levels of all the key protective nutrients – what levels, and which form.

*Health Defence* is an absolute must for anyone interested in proactive healthcare – avoiding and correcting the imbalances in the body which can ultimately lead to degenerative disease.

If you order now, we'll send you a FREE copy of the companion *Health Defence Cookbook*. It is co-written by TV cook Portia Spooner and worth £5.95.

“There are health books and there are gourmet cook books, but rarely are there books with healthy recipes that can be described as both.”

Caroline Waldegrave,  
Principal of Pru Leith's School of Food and Wine

“Beautifully illustrated in lavish colour, this is a 'must have' cookbook.”

The Nutrition Practitioner

Order your copy of *Health Defence* at just £10 from:

Accelerated Learning Systems Ltd

[www.acceleratedlearning.com](http://www.acceleratedlearning.com)

FREEPOST AL886, Aylesbury, Bucks HP22 4BR  
or 50 Aylesbury Road, Aston Clinton, Aylesbury, Bucks HP22 5AH

Tel: Freephone 0800 502020 or 01296 631177  
email: [sales@acceleratedlearning.com](mailto:sales@acceleratedlearning.com)

---

# An Introduction to HEALTH DEFENCE

Dr Paul Clayton



■ © Paul Clayton 2010

**Accelerated Learning Systems Ltd**

Aylesbury, Bucks, UK.

Tel. 01296 631177 Fax. 01296 631074

**[www.acceleratedlearning.com](http://www.acceleratedlearning.com)**

All rights reserved. No part of this booklet may be reprinted or reproduced or utilised in any form or by any electronic, mechanical or other means, including photocopying and recording, or in any information storage or retrieval systems, without permission in writing from the publishers.

---

## Some reviews of the HEALTH DEFENCE book

- "Health Defence is dramatic in its conclusions and impressive in scope.  
The concept of establishing the optimum amount of nutrition for health is extremely important."  
**Dr John Marks, Life Fellow, Girton College**  
**University of Cambridge**
- "A well written and carefully constructed argument ... with much convincing new information.  
This book can be strongly recommended."  
**Malcolm Hooper,**  
**Emeritus Professor of Medicinal Chemistry, University of Sunderland**
- "An invaluable resource for all who wish to maximise their quality of life."  
**Maurice Hanssen**  
**Author of *E for Additives***
- "A truly outstanding and revolutionary book. Dr Paul Clayton has developed a multitude  
of creative and innovative solutions for the promotion of human health and wellbeing."  
**David Richardson**  
**Visiting Professor, Food and Nutrition Science**  
**University of Newcastle on Tyne**
- "This is a fascinating and immensely readable book. I have always appreciated the importance  
of diet in my life, but this book takes it to a new level."  
**Jonathan Edwards**  
**Olympic Gold Medallist**
- "This book serves the medical doctor extremely well, and is worth having for the home too.  
I have already given five copies away to my family."  
**Dr David T H Williams**  
**Independent medical practitioner**
- "This book is a must for everyone – it will educate and inspire."  
**What Medicine? Magazine**

---

# An Introduction to HEALTH DEFENCE

Dr Paul Clayton

Your chronological age and your biological age are not necessarily the same... Some people age faster than their calendar years – others age more slowly. They look younger and act more youthfully.

Although genetics plays a part, the underlying reason is that our bodies have amazing powers of self-healing and regeneration – given the right nutrition and lifestyle. Slow agers have a lifestyle that supports that process of regeneration.

This is further underlined by the fact that very few people – perhaps 1 in 10,000 – die of old age. The vast majority of us sicken and die prematurely, picked off by 'natural causes' long before our biological life span has run its course.

Average life expectancy in the First World is now around 75 years for men and 82 for women; but cell culture studies, and the very few individuals who live on healthily into their second century, indicate that our true life span may lie between 110 and 120.

So why is a long and healthy life such a rarity? Why do so few of us live out our biological potential?

We used to die, in the main, of infection or trauma. Twentieth century medicine has scored significant victories against these; the major causes of ill health and death now are the chronic degenerative diseases such as coronary artery disease, stroke, Alzheimer's and cancer.

***If you can cut your risk of these degenerative diseases, you automatically give yourself the chance of not just a longer life – but a longer quality of life.***

Fortunately we have a good scientific guide as to what to do. This is derived partly from the thousands of research papers on which *Health Defence* is based, partly from studies on the people who do achieve active and healthy old age, and partly by analysing the lifestyles of populations where the incidence of cancer or heart disease is a fraction of our own in the West.

## ■ Health

**The usual medical definition:**

Absence of clinically defined disease.

**My definition:**

Noticeable energy, absence of clinically defined disease – plus no signs of sub-clinical, ie pending disease.

## ■ Regenerative Medicine

Degenerative diseases are so-called because Western doctors have long believed they are part of the ageing process, and irreversible.

But there are other cultures where, for example, arteries do not furr up with age; and disease irreversibility has been disproved by new nutritional therapies which successfully re-built worn joints, and re-opened clogged arteries. In other words these diseases can be slowed, stabilised and even cured.

*See Chapters 10 and 14 of Health Defence.*

## ■ Prevention or Cure?

### A clear equation

The British Health Service is really an 'illness service' – treatment after things go wrong. It costs over £750 a year for every man, woman and child in the nation.

Improving and supplementing your diet costs a fraction of this.

The difference in philosophy is that conventional medicine waits for something to go wrong and then tries to suppress that particular symptom with 'magic bullet' drugs. These chemicals, with which the body is not familiar, carry a high risk of side effects.

Preventative nutrition is pro-active and holistic. It uses compounds which the body is familiar with, indeed depends on.

It aims to gently boost your body's own repair mechanisms and defences against hostile environmental factors – such as pollution, stress, free radicals, toxins, carcinogens, bacteria and viruses.

It helps deal with the **causes** of potential problems.

For example, the relative immunity of the Mediterranean cultures to heart disease is clearly due to various components in their diet. These include the mono-unsaturated fatty acids in olive oil, the flavonoids in red wine, and other anti-oxidant nutritional compounds such as lutein in kale and other green leaf vegetables, and lycopene in tomatoes.

In terms of other diseases, however, such as breast and prostate cancer, the French and Italians don't do nearly as well as the Japanese and Koreans, who seem to be protected from these illnesses due to their high consumption of soy products, selenium and green tea, and low intake of saturated fat and calcium.

And in African cultures where a high fibre diet is still consumed, the incidence of colon cancer is far lower than it is in the USA – or, for that matter, in France and Britain.

In other words, every country and every culture has its own strengths and weaknesses.

If we could take the most protective nutrients from each culture's diet and combine them with the most protective nutrients identified from clinical trials, we could begin to define a diet that would significantly cut the risk of degenerative disease, and far more people could live long and healthy lives.

The good news is that we now have the knowledge to do this. But first we have to understand the problem.

## The natural process of wear and tear

Almost every cell and tissue in your body breaks down and is replaced on a regular basis. Bone is re-absorbed into the body and then renewed, cartilage in joints experiences wear and tear but is renewed, membranes of nerve and other cells are broken down and replaced. This natural process of wear and repair is going on all the time in your more than 60 trillion cells.

The process of growth and re-growth in bones, cartilage and other tissues is known as anabolic. The process of tissue breakdown is catabolic.

### The first 20 years – growth in cells exceeds breakdown

In approximately the first 20 years of life, rates of tissue-building greatly outstrip the rate of tissue breakdown, and we grow physically in size. This is known as 'anabolic dominance'.

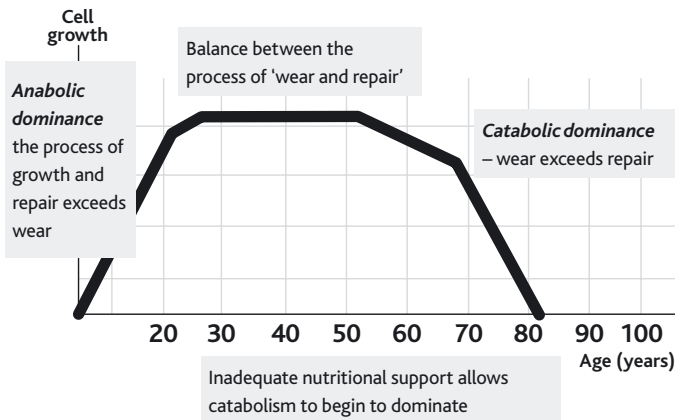
## Between 20 and 50 – balanced wear and repair

Then comes a period – typically the third and fourth decades of life – where the processes of breakdown and repair are more or less in balance. There is little apparent change, but under the surface tissues and organs are constantly renewing themselves.

## Over 50 – wear starts to exceed repair

Finally there comes a period when wear exceeds repair – a condition known as 'catabolic dominance'. Arteries begin to fur up, bones get weaker, cartilage thins, brain and other cells start to malfunction. Symptoms of degenerative disease appear and we begin to age – sometimes rapidly.

The first illustration shows what we have come to expect as inevitable.



## But it doesn't have to be like that

Catabolic factors come to dominate because, as we age, too many people become ever-more depleted in the nutrients needed for tissue repair, and also in the nutrients needed to slow tissue decay. Sub-optimal nutrition allows the forces of wear to exceed the forces of repair leading directly to catabolic dominance.

However, by supporting your body's own natural powers of self healing through optimum nutrition and a healthy lifestyle, you can extend the period where wear and tear are in balance.

That reduces the risk of disease, and you should therefore stay healthy longer and age more slowly. This second illustration summarises the objective.

## Changing needs

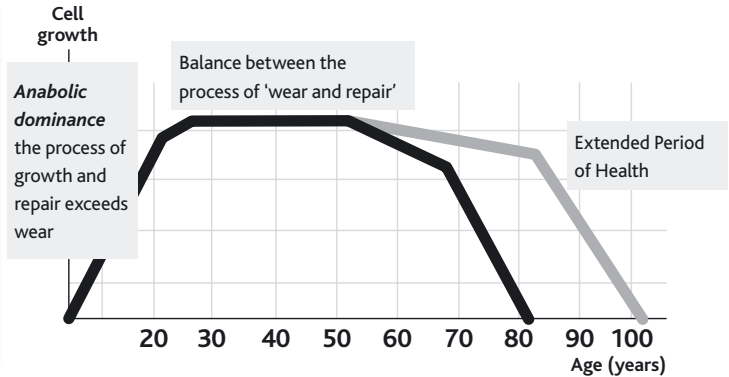
Our nutritional needs are fine-tuned to conditions of life that existed over 10,000 years ago, when we were evolving. We are genetically unchanged but our diet and lifestyle are radically different.

Thousands of generations of people were hunter-gatherers, 500 generations depended on agriculture, 10 generations have lived since the start of the industrial age; but only two have grown up with highly processed 'convenience' foods.

This is a nutritional experiment out of control – and is probably the main reason why so many of us develop degenerative diseases.

## Multiple depletion

Surveys show that almost everyone is not only depleted in the vitamins and minerals needed for tissue repair; but also the flavonoids and carotenoids which slow tissue breakdown. This is a recipe for illness.



Comprehensive nutritional support during this period can improve the process of repair and slow the process of wear

## Balancing wear and repair



More wear than repair  
→ disease



Less wear than repair  
→ healing



Wear balanced by repair = health

## Why prevention is (*much!*) better than cure

Coronary artery disease, cancer, Alzheimer's, diabetes and osteoporosis do not occur overnight, although the symptoms might do. They are slowly progressing conditions, which develop for years or decades before symptoms finally emerge.

In other words, many apparently healthy people over the age of 45 are in fact **pre-ill**. They contain in their bodies the seeds of the illness which will eventually become overt, and perhaps kill them. An artery is beginning to silt up; bone is thinning; brain cells are dying – leading eventually to a heart attack, osteoporotic fracture, or dementia.

But if we were to focus preventatively on the pre-ill, perhaps we could slow or stop these diseases before they became clinical. Or reverse them.

This is the core of the new 'nutritional medicine'; a preventative approach which uses optimum nutrition and lifestyle to correct the metabolic errors before the first twinge of angina, the first broken bone, or the first shadow on the X-ray – in other words, *Health Defence*.

## Our nutrition is NOT optimum

We sicken and age prematurely because in almost all of us, the repair mechanisms are below par and the processes of decay are in overdrive. And the balance of evidence shows that, in the majority of cases, this is due to **multiple micro-nutrient depletion**.



Surveys, like the one in the margin, show that most people are depleted in most micro-nutrients.

But depletion levels are far worse than this chart implies, because it only shows those 'conventional' nutrients that have historically had the most research devoted to them. And they are based on Recommended Daily Amounts which are *minimum* rather than *optimum* levels.

Other nutrients like the Omega 3 oils, isoflavones in soy, the flavonoids in fruits and vegetables, carotenoids like lycopene and lutein, and prebiotic fibres have as much, if not more, 'healing power'. And depletion levels are even worse for them.

If the body has inadequate nutritional support it is vulnerable to the main threats to your health that most contribute to disease.

## The four main threats to your health

Although the main degenerative diseases seem very different, they share some surprisingly similar underlying causes. In fact, the latest research indicates that just four main factors underlie most health problems, and a good diet supplemented by the right nutrients at the right levels can help protect against each one.

A 'good diet' can be defined as the so-called Mediterranean Diet, with olive oil as the principal fat, lots of fresh fruit and vegetables, whole grain bread and cereals, beans and lentils, nuts and seeds, moderate amounts of oily fish and eggs, up to two glasses of red wine a day and limited red meat. This diet is also a Low GI (Glycaemic Index) Diet. [Glycaemic Index refers to the rate at which the intake of a particular food raises blood sugar levels.]

The four threats are:

- 1 Free radical damage
- 2 Immune system failure
- 3 Inflammation
- 4 Excessive insulin stress

### Nutrient Intakes

(USDA) Survey 1999

% Population who are depleted

Vitamin A	55
Vitamin E	68
Vitamin C	37
Vitamin D	42
Vitamin B1	32
Vitamin B2	31
Niacin	27
Vitamin B6	54
Vitamin B4	34
Vitamin B12	17
Selenium	53
Chromium	66

### Depleted vegetables

The average mineral content of fruits and vegetables has declined dramatically in the last 50 years.

Between 1940 and 1991 magnesium has declined by 25%, calcium by 47%, iron by 36%, and copper by 62%.

Source:

*The Composition of Food, McCance and Widdowson, Eds 1-5, RCS and MAFF.*

## ■ A common phenomenon

Free radical damage manifests itself, for example, as rust when metal oxidises, in the browning of apples as they oxidise and in rancidity when fat oxidises.



When the fatty acids in body cells are oxidised by free radicals, they form, among other things, lipofuscin. In skin, lipofuscin forms so-called liver spots which are unsightly.

Inside nerve cells, however, the accumulation of lipofuscin contributes to a decline in nerve function, and the steady loss of brain cells which occurs as we age.

Let's look at these four threats in a little detail.

## 1 Defeating free radical attack

Free radical damage is involved in most of the diseases which ultimately kill us. And it is deeply involved in the ageing process.

Our bodies are built out of rather less than a hundred different kinds of atom. All atoms consist of a nucleus at the centre surrounded by a shell of electrons spinning round the nucleus, like planets round a sun.

However certain processes such as radiation, or the oxidation which continuously takes place in our own bodies, may knock an electron out of its shell. This leaves an unpaired electron. Atoms with unpaired electrons are free radicals. You can actually see free radical damage when oxygen in the air reacts with fat to oxidate it – turning it rancid. Or when the surface of an apple becomes oxidated and turns brown.

Free radical action is an inevitable and continuous process, but when it becomes excessive it is extremely destructive. When body cells are left unprotected from free radical (oxidative) action, damage to cells can lead to many types of disease.

When free radicals attack the cell's genetic material (DNA) this can, if not repaired in time, lead to cancer.

## ■ An unprotected cell being attacked by free radicals



If free radicals oxidise cholesterol in the blood this can contribute to 'furring' of the arteries and heart disease.

If free radicals attack the mitochondria (the cell's power generators), they can impair the cell's energy balance to such an extent that the cell eventually 'commits suicide' and dies. The result is accelerated ageing.

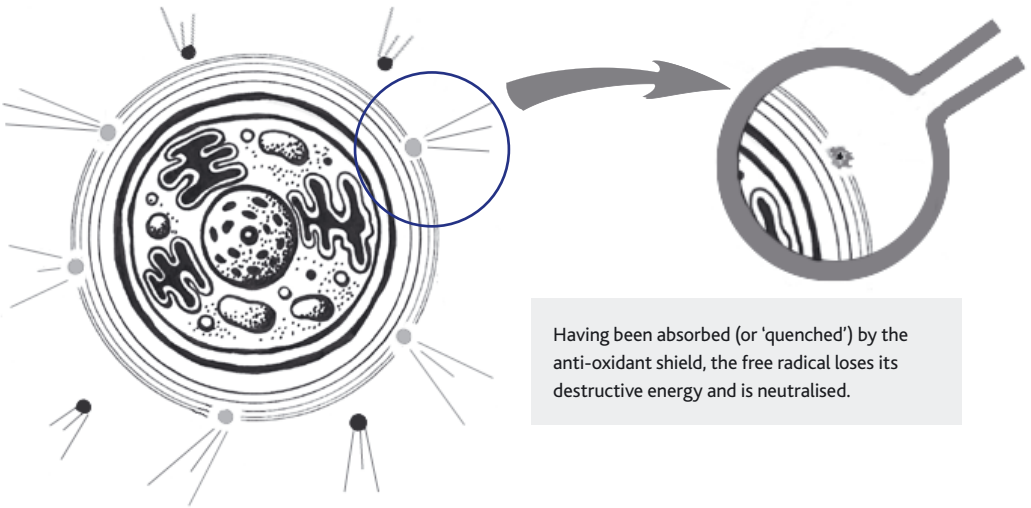
Indeed free radicals are a major cause of ageing in general as they contribute to the gradual deterioration of organs and to diseases such as cancer, arthritis, Alzheimer's and cataracts. Your body's cells are involved in a running battle of oxidative damage versus repair.

Fortunately there is a defence. Certain nutrients have anti-oxidant properties as do certain enzymes. These anti-oxidants can donate one of their own electrons to a free radical, thus neutralising it. In doing so they effectively form a protective shield against free radical attack and therefore against the damage it causes.

The anti-oxidant enzymes and anti-oxidants each provide specialist defence in different parts of the cell, but they also work together, which is why you need a comprehensive range of anti-oxidants, in optimum amounts – as the diagrams on the following two pages show.

Important anti-oxidants include vitamin C, vitamin E (preferably in the form of mixed tocopherols), beta carotene, flavonoids (found in fruits and vegetables), green tea extract, lycopene (from tomatoes), co-enzyme Q10, and lutein as well as mineral co-factors like selenium, copper, manganese and zinc.

Fruits and vegetables are the chief source of many vital anti-oxidants. The ones with the most protective nutrients are listed for you in the margin of page 12, as we explore how to defend yourself against the four main health risks.



When a cell is protected by an anti-oxidant shield – the right combination of anti-oxidant enzymes, vitamins, minerals and other components – the 'shield' absorbs most of the free radicals.

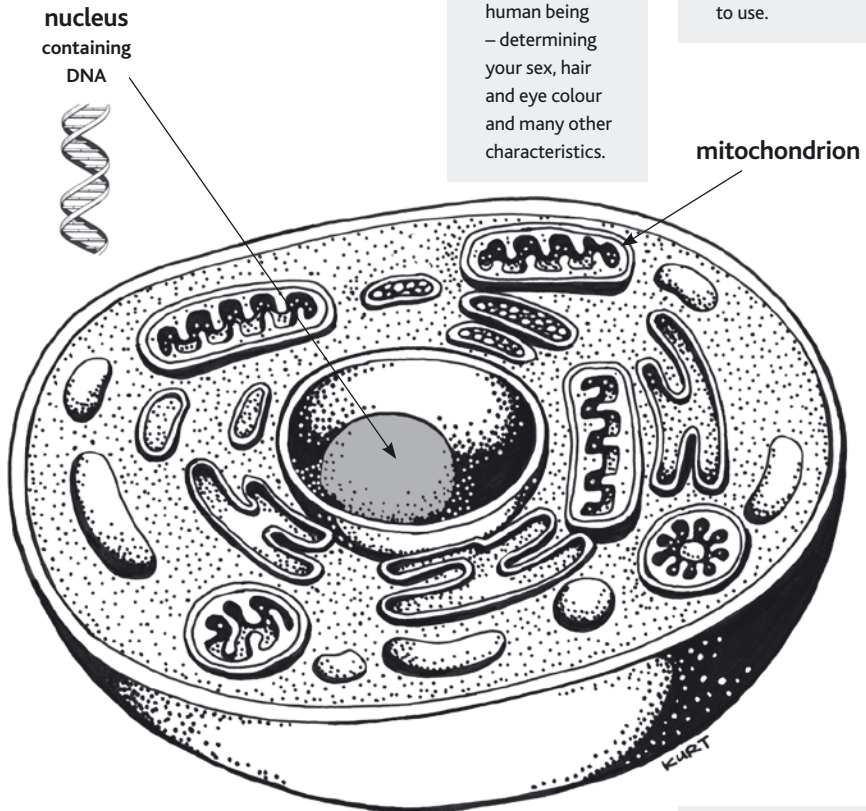
Having been absorbed (or 'quenched') by the anti-oxidant shield, the free radical loses its destructive energy and is neutralised.

## How anti-oxidants protect your cells

**1** This is a cross-section of the inside of a body cell magnified approx. 10,000 times.

**2** Inside the cell is the nucleus which contains most of the cell's DNA. DNA itself contains the genetic codes that make you a unique human being – determining your sex, hair and eye colour and many other characteristics.

**3** Also inside the cell are mitochondria. They are the energy factories of the body – where the energy in food is converted into energy for you to use.



nucleus  
containing  
DNA

mitochondrion

**4** Free radicals can attack all parts of the cell. Damage to DNA can lead to cancer. Damage to mitochondria can lead to premature ageing.

**5** Different anti-oxidants protect different parts of the cell. They are like specialist defence troops.

**6** Vitamin C is water-soluble, and protects against free radicals in the blood and the watery fluids that bathe our cells.

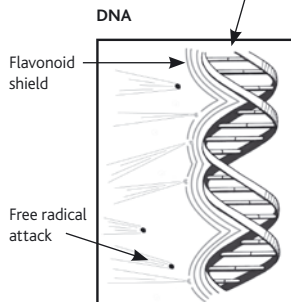
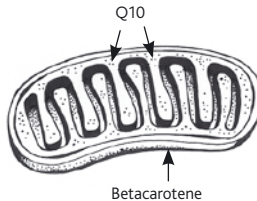
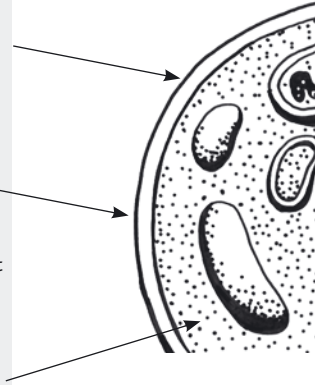
**7** Vitamin E and other fat-soluble anti-oxidants including the **carotenoids** and **co-enzyme Q10**, protect fatty structures such as cholesterol particles in the blood and cell membranes. But they need Vitamin C to be present in the right ratio to be effective.

**8** Large amounts of free radicals are produced in the mitochondria. **Q10** acts inside the mitochondria, and **beta carotene** protects the mitochondrial walls.

**9** Anti-oxidant enzymes neutralise free radicals in almost all areas. They depend on adequate **trace elements** (see column on right).

**10** When free radicals damage DNA in the cell nucleus, that cell may die or grow out of control and become a cancer.

**11** Some flavonoids like **grapeseed** and **bilberry** may bind close to DNA, providing a local anti-oxidant line of defence. **Flavonoids** can also protect collagen and elastin fibres which give skin its firmness – and help slow the appearance of ageing.



## The secret is a combination of anti-oxidants

These diagrams show why it's so important to use a supplement that contains a broad range of anti-oxidants in the right amounts and in the right form.

No single anti-oxidant can provide comprehensive protection. Different vitamins and minerals provide different defences in different places.

For example, anti-oxidants that locate in the mitochondria help protect against mitochondrial ageing. And anti-oxidants that protect lipids (fats) slow the process that leads to dementia and heart attacks.

In addition, certain anti-oxidants only function properly in combination with other anti-oxidants. Vitamin E and carotenoids protect fats in your body from oxidation – but only if sufficient Vitamin C is present. And mixed tocopherols are more effective than simple vitamin E – d-alpha tocopherol.

The body can't make vitamins or minerals, but it does make its own anti-oxidant enzymes.

But production of these enzymes depends upon there being enough trace elements like selenium, copper, zinc, manganese and iron present in your diet.

***So you cannot protect with a single anti-oxidant. Only a full range can offer comprehensive cover.***

## ORAC Units

The US Government, working with the world-famous Tuft's University in Boston, measures the anti-oxidant protection provided by foodstuffs in ORACs (Oxygen Radical Absorbance Capacity).

Typical diets provide 1,400-1,500 ORACs a day: optimal intakes are estimated to be 3-5,000 ORACs. To achieve that, you would need to eat 10-15 servings of fruits and vegetables a day – or add a high ORAC-scoring supplement to your diet.

## Lifestyle influences

Nutrition is not the only influence on the immune system. The immune system is also affected by chronic worry, repressed anger and depression. These have all been shown to reduce the ability of immune cells to form antibodies and to slow down the action of killer cells.

So relaxation techniques and other lifestyle changes also have a part to play in staying healthy.

Herbs and other plant compounds, like thyme, ginger, garlic, chilli, paprika, green tea, turmeric (the yellow spice in curry), all contain potent anti-oxidants. Red wine also contains powerful anti-oxidants – as do grapeseed, grape juice and dark chocolate.

The anti-oxidant protection offered by foods (and supplements from food sources) can now be measured in ORACs (standing for Oxygen Radical Absorbency Capacity) which measure the ability of nutrients to absorb and neutralise free radicals.

A diet of five servings of fruit and vegetables typically provides about 1,400-1,500 ORACs per day. A standard 'one-a-day' vitamin and mineral pill typically provides 300 ORAC units – the anti-oxidant equivalent of a single portion of fruit and vegetables!

The evidence suggests, however, that we may need as much as 3-5,000 ORAC units per day to stay really healthy.

The recommended supplement levels that I propose provide over 4,500 ORAC units a day. Combined with a realistic and healthy diet, this will also defend you against the three other main causes of degenerative disease – and would put you in the top 1% of healthy diets on the planet.

## 2 Strengthening the immune system

Modern lifestyles have increased the external threats to our health. At the same time levels of micro-nutrients in the diet, vital for immune function, have become reduced.

If the level of threat is increased and defences are weakened, the chances of illness must increase. Nevertheless, disease only becomes evident when your immune system is finally overwhelmed by the attacking organisms.

For example, we now recognise that cancers start to grow relatively frequently in our bodies, but most don't become a problem because the immune system spots that the cells are different – and dispatches 'killer' **T-cells** to destroy them.

Other immune system cells include the **macrophages** which digest and kill bacteria, the **neutrophils** which also kill invading bacteria and viruses and the **B-cells** which produce antibodies that destroy infected cells.

All these different defence cells which help maintain a strong immune system need an optimum supply of over 20 vitamins and minerals to function well. These include vitamins A, C and E, the B vitamins and the minerals zinc, copper, manganese, iron, selenium, chromium.

It is well known that the immune system normally declines with age and becomes less effective. This is why the elderly are more prone to infections, and why they take longer to recover. It is also one reason why the risk of cancer increases in old age.

In short, when levels of key nutrients are below optimum it disturbs the balance between the ongoing process of wear and repair, and weakens our immune system. Drugs cannot remedy this syndrome of multiple micro-nutrient depletion which leads to illness. Only well-designed nutritional programmes, specifically assembled to support regenerative function and slow the processes of decay, can do it.

In addition we have recently discovered that a natural compound called 1-3, 1-6 beta glucans, found in yeasts and moulds, is a very powerful and specific immuno-primer. Of all the natural compounds known to activate the innate immune system, it is the best documented and most effective.

The Canadian Department of Defence has researched over 300 different immuno-primers and a patented form of 1-3, 1-6 beta glucans (Wellmune WGP 3-6) came out as the most effective.

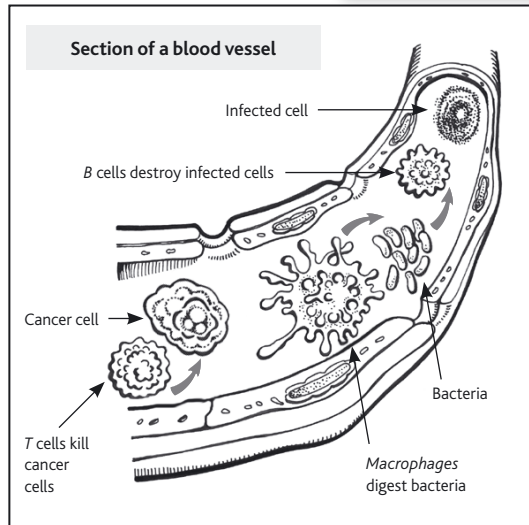
The detail of how this compound works is beyond this introduction, but can be found on my website [www.drpaulclayton.com](http://www.drpaulclayton.com). For the moment it is enough to know that our immune system long ago developed the ability to recognise 1-3, 1-6 beta glucans and react to them by mounting an increased immune response – indeed it actually became dependent on them to function at peak effectiveness.

## ■ Eating badly

Our eating habits are deteriorating. Children in the UK eat less fruit and vegetables than in the 1950s; and only 15 per cent of Americans eat the recommended amounts.

## ■ Designer beans

Over the last few decades, plant breeders have produced carrots, peas and other vegetables which are sweeter, with less bitter or astringent 'notes'. Unfortunately, we now know that the bitter and astringent flavours were often due to compounds critical to our long-term health.



## ■ Top anti-oxidant foods

### Fruits

Prunes  
Blueberries  
Blackberries  
Raspberries  
Cranberries  
Pomegranates  
Strawberries  
Raisins

### Vegetables

Kale  
Spinach  
Broccoli  
Sprouts

### Spices

Turmeric  
Cinnamon  
Cloves

*NB: Whilst onions are not particularly high in ORAC ratings, there is clear evidence that high onion and garlic intake is correlated with significantly lower cancer risk.*

## ■ Top anti-inflammatory foods

### ■ Flavonoids in fruit and vegetables

- Omega 3 oils
- Pre-biotics
- Soy isoflavones
- Curcuminoids

Then, very late in the evolutionary day, modern technology effectively sterilised our food chain and much of our environment. Levels of yeasts and mould in our foods, on our bodies and in our houses dropped away; and left the innate immune system less challenged and weaker. This is the so-called 'Hygiene Hypothesis' and is supported by the observation that children with pets and who play outdoors, tend to have rather stronger immune systems.

Adding 1-3, 1-6 beta glucans back into the diet restores the effectiveness of the innate immune system, with considerable health benefits. (For the full fascinating story, see *Immune System Threats* on my web site at [www.drpaulclayton.com](http://www.drpaulclayton.com)).

## 3 Reducing inflammation

Inflammation is involved in many degenerative diseases. It is the cause of pain in arthritis. And when the lining of the arteries becomes inflamed, compounds become attracted to that site and start the process that ends in the build-up of oxidised cholesterol – atheroma. In turn the build up of cholesterol causes a narrowing of the arteries and the potential for heart attack and stroke.

In addition, inflammation is involved in asthma, in Alzheimer's, and in some cancers – especially of the bowel and colon.

Unfortunately, our modern diets are generally low in anti-inflammatories. Good sources of anti-inflammatory nutrients include the flavonoids in fruits and vegetables, Omega 3 oils, the pre-biotic fibres in whole grains and certain vegetables, the isoflavones found in soy and the curcuminoids from turmeric – the yellow spice in curry.

## 4 Reducing insulin stress

Starchy foods, confectionery and many baked goods have a high GI – Glycaemic Index – that is, they raise blood sugar levels quickly which triggers the release of insulin. And diets that contain a lot of high GI foods are assessed as having a high Glycaemic Load (GL). Over time, this constant triggering of insulin can lead to insulin resistance and excessive sugar levels in the blood.



Insulin stress can cause a variety of health problems including Type 2 diabetes. Diabetes in turn raises the risk of heart disease, stroke, blindness, kidney failure and dementia. Insulin stress also causes cross linking of cells in the skin – accelerated ageing and wrinkles.

The obvious counter measure is a low GL diet – featuring fruits and vegetables, complex carbohydrates like whole grains, fish and low fat meats, combined with nutrients that reduce stress on the insulin mechanism.

Helpful nutrients include pre-biotic fibre, flavonoids, chromium, manganese, and cinnamon.

## ■ An anti-ageing diet should:

- 1 Be high in Anti-oxidants
- 2 Be high in Anti-inflammatories
- 3 Support the immune system
- 4 Have a low Glycaemic Load

In summary, diets and nutritional supplements that lower the *GL factor* and include significant amounts of *anti-oxidants*, *anti-inflammatory nutrients*, and *immuno-boosters*, are healthy and protective. And they are the dietary elements that slow ageing. But does our usual diet deliver them?

## The well-balanced, nutritionally *deficient* diet

At medical school I was taught that you could obtain all the nutrition you needed from a well-balanced diet. After all, we evolved without vitamin pills – which were thought to mainly produce expensive urine!

I am now convinced, however, that anyone over the age of 45 needs a comprehensive nutritional supplement. Here's why.

### 1 We don't eat enough!

As hunter-gatherers we were designed to live active lives, and to consume 3000 to 4000 calories per day. We ate more roots, shoots, nuts and berries – supplying much higher levels of vitamin E, vitamin C, fibres and flavonoids than we get from a modern diet. Our diet has changed unrecognisably from that which our metabolism was designed to run on.

We now lead sedentary lives, and burn far fewer calories. When we eat less, we're also consuming fewer micro-nutrients.

### 2 We eat too many processed foods

Many (not all) processed foods are depleted in micro-nutrients – and we're eating more processed foods than ever before.

## ■ Defence starts with a full range of micro-nutrients

The start point in health care is a full range of vitamins, minerals and other micro-nutrients. Between them, they provide anti-oxidant protection, strengthen the immune system and support the body's own repair mechanisms.

### 3 The soil is depleted

Soils in many areas are naturally depleted in various minerals. There is evidence that intensive farming can reduce plant mineral uptake further. Plants or animals raised in these areas are therefore depleted in these minerals. UK intakes of the anti-cancer mineral selenium, for example, are worryingly low.

### 4 Absorption of nutrients from food is not always good

Although boosting your intake of fruit and vegetables is the first priority to reduce the risk of degenerative disease, it is not automatically the best way to obtain all the protective micro-nutrients.

For example, absorption of carotenoids from green leaf vegetables is not good, and certainly not as good as from supplements. The bio-availability of beta carotene when consumed as carrots, the traditional food source, is only a third as good as beta carotene in supplement form.

Another example: Folic acid depletion increases the risk of heart attacks and spina bifida in babies. Yet eating a 'better' diet has little effect on folic acid levels in the blood—whereas folic acid supplements raise folic acid levels very rapidly. Pregnant women are nowadays routinely prescribed folic acid supplements.

### 5 Pollution

New environmental pollutants in the water, the air and the food chain stress the immune system and create free radical damage. (The American Chemical Society recently announced the synthesis of the 10 millionth new chemical.)

### 6 Bad habits

Smoking, excessive drinking and extreme exercise, all deplete the body of anti-oxidants.

### 7 Ageing

Although the saying is that life begins at 40, scientists don't agree. According to Canadian age researchers, women entering their 40s can expect on average to have aged 18 biological years by the time they have reached 50 – while men age 15 years!

The trouble is that we become progressively more depleted in more

micro-nutrients as we get older. We become less active, so appetite, food and micro-nutrient intake fall further. To make matters worse, older digestive systems are less efficient at absorbing micro-nutrients.

Finally, older people take more medications, some of which can make micro-nutrient depletion worse.

So, for these seven reasons, **most** people are depleted in **most** micro-nutrients, as current national surveys show.

## The RDAs are not enough

The way we live makes it impossible to obtain all the nutrients we need at the level we need them from even a 'well-balanced' diet.

About 40% of adults in the UK and 50% in the USA now take a vitamin and mineral supplement. But most have been lulled into thinking that an A-Z type supplement, incorporating the Recommended Daily Allowances (RDAs) of a limited range of nutrients, will do. It won't.

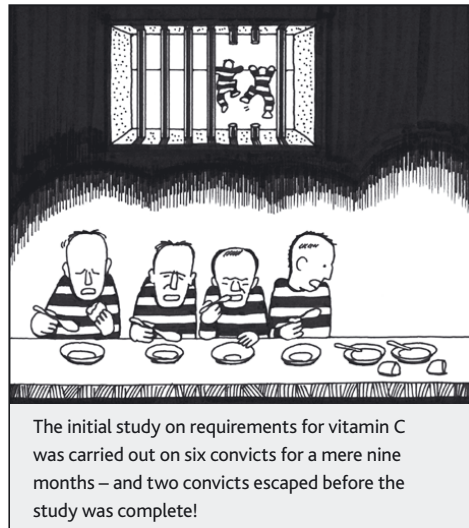
When it originally drew up the RDAs, the National Academy of Sciences never claimed these represented nutrient intakes

designed to achieve optimal health. They were never more than a safety net, with the specific purpose of preventing deficiency diseases.

The RDA concept suffers from three major weaknesses. Firstly, RDAs are average values and do not take into account the needs of the individual, which may be much higher in many circumstances – for example as we get older, live more stressful lives, drink or take medications.

Secondly, the doses sufficient to prevent deficiency diseases are not high enough to maintain optimal health.

Thirdly, some absolutely vital nutrients have not yet had RDAs established for them. For example in all the following cases the RDA is either inadequate or non-existent, and, as the comments in the margins show, intake has fallen significantly.



### ■ Reduced intake of vitamin C

The main sources of vitamin C are citrus fruits and berries. Intake has probably fallen by 80-90% since the Neolithic period.

## ■ Too little Omega 3 and too much Omega 6

Intake of Omega 3 poly-unsaturated fatty acids has fallen by an estimated 75% since Neolithic times. We're eating too much Omega 6 and not enough Omega 3.

## ■ Isoflavones

The level that I recommend (40mg) will provide you with an intake similar to the diet eaten in countries like Korea or Japan, where the rates of some of the major cancers are very much lower than in the (non-soy-eating) West.

## ■ Insufficient methyl groups

Despite the fact that betaine helps protect against heart disease, stroke, cancer and Alzheimer's, there is no RDA for it – and an estimated 95% of people are depleted in the methyl groups which betaine supplies.

## Vitamins C and E

A fairly recent and very powerful study showed that a daily intake of 180 mg of vitamin E combined with 500mg of vitamin C can slow the development of coronary artery disease by 50%.

The RDA for vitamin C is a mere 60mg, which appears to have been rounded from the average daily intake of vitamin C, which is 58mg. The optimum level would, I believe, start at 500mg a day. The RDA for vitamin E is an absurd 10mg; the average Western intake of this essential micro-nutrient is, conveniently, 9.3mg. The optimum level is at least 100mg – and that is in the form of mixed tocopherols.

## Omega 3

Found in oily fish and certain plants, Omega 3 protects against heart disease, and has a role to play in defending against inflammatory conditions like asthma and arthritis.

The average person's intake of Omega 3 is about 150mg a day, far below the level that the UK government is currently considering recommending, which is 350mg a day. I believe the optimum is 750mg.

## Isoflavones

Isoflavone compounds (like genistein) are found in soy, and have remarkable defensive powers against cancer. They can not only force cancerous cells to revert to normal, but can also help choke off the blood supply to emerging tumours. In addition, they have an important role to play in minimising problems linked to the menopause.

While there isn't, as yet, an RDA, the average daily intake of isoflavones in the West is as low as 5mg, in contrast to at least 40mg in countries like Japan and Korea where cancer rates are far lower.

## Betaine

Betaine helps lower levels of a toxic amino acid (homocysteine) that can build up in the body, and which is implicated in heart disease and Alzheimer's. Betaine supplies a vital group of compounds to the body, called methyl groups.

At the correct levels, betaine also increases the body's resistance to stress, toxins, carcinogens and infection; and enhances liver and kidney function.

## Selenium

The average intake of selenium is 35mcg and, although there is no official UK RDA, the optimum intake is likely to be 120-200mcg. This depletion is serious because selenium has a vital role in protecting against heart disease, stroke, and cancer.

## Flavonoids

Found in fruits and vegetables, in grapeseed extract and in green tea, flavonoids also protect against heart disease, stroke, and cancer – yet the estimated average intake of these nutrients is 140mg against an optimal daily intake of probably around 500-1000mg. And there is as yet no RDA.

We're eating less than half the amount of fresh fruit we did at the turn of the century and more processed fruit. Unfortunately, the highest concentrations of flavonoids in fruits and vegetables tend to be found in the leaves, skin, peel and seeds. And industrial processing methods almost invariably discard these parts.

## Carotenoids

Carotenoids, the nutrients that provide the colour in many fruits, have anti-oxidant and anti-cancer properties. Key carotenoids are beta carotene (found in carrots and mangoes), lutein (found in kale) and lycopene (from tomatoes). Despite their critical importance, no RDA has yet been determined.

The available data indicates that intakes of all these carotenoids are much lower in the average diet than the likely optimum. (The typical diet provides just 2mg of beta carotene a day, for example, against an optimum of 7 to 10mg.)

Warning: There is evidence that smokers should not supplement with beta carotene, or with other carotenoids unless combined with vitamin C.

## Co-Enzyme Q10

Q10 is a vitamin-like substance and one of the few nutrients that can protect the mitochondria (the tiny energy factories inside each body cell). It also has an important role in maintaining a healthy heart.

### ■ Reduced selenium

Grains are the main source of selenium. Intake has fallen by 50% in the last fifty years, due mainly to the depletion from intensive farming.

### ■ Reduced flavonoids

Intake of flavonoids has fallen significantly – probably by as much as 75% – since Neolithic times.

### ■ Reduced carotenoids

Intake of carotenoids has fallen by an estimated 50% in the last century alone.

### ■ Reduced Q10

We do make Q10 internally but our bodies make less as we get older. Low levels of Q10 now appear to be a major factor in ageing – yet few supplements contain it, and there is no RDA.

## ■ Reduced pre-biotics

The estimated intake of pre-biotic fibre has fallen by about 50% in the last century.

### Pre-biotics

Pre-biotics are the non-digestible fibres found in Jerusalem artichokes, onions and oats (see *Health Defence* chapter 7). They have immunostrengthening properties because they encourage the growth of healthy pro-biotic bacteria in the gut including lactobacilli and bifidobacteria.

Pre-biotics are considered to protect against bowel and colon cancers, and probably liver and breast cancers too. They also help to normalise bowel function.

The estimated average intake of this type of non-digestible fibre is about 3g a day. You need 8g or more, but again there is no RDA.

## Only comprehensive nutrition will do

With demand for nutrients increasing and intake levels falling, it is hardly surprising that as we get older, we become more likely to get sick and age prematurely. It is little to do with ageing per se, as few of us get even close to our theoretical life span. It is due to a multiple systems failure caused by a cumulative depletion of many micro-nutrients.

If you skimp on maintaining your car, it will eventually break down. If you do not give your body the micro-nutrients it needs, it too will break down.



If you skimp on maintaining a car it eventually breaks down. So do people!

Think of car maintenance again. To keep your car on the road you need to change the oil every now and then; but you must also replace the spark plugs, tyres, oil and air filters, adjust the fan belt, and so on. A human being is far more complex than a car, and requires much more extensive nutritional maintenance – which is why taking just a single nutrient makes no sense.

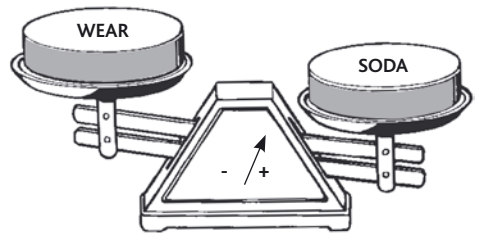
For example, we have seen that a combination of vitamin E and vitamin C reduces the risk of coronary artery disease; but so do fish oils, the carotenoids lycopene and lutein, betaine, the flavonoids and many other micro-nutrients. Now we understand that all these compounds work in different but complementary ways, it is logical to combine them.

Should we analyse each individual's nutritional status and then tailor a formula specifically for him or her? After all, different people have different lifestyles, and eat different foods.

We don't need to, because the vast majority of people are consuming sub-optimal amounts of most micro-nutrients; and most of the micro-nutrients concerned are very safe. So if we wish to improve the general health of the nation, a comprehensive and universal baseline programme of micro-nutrient support should be the most cost-effective and safest way of achieving this.

It should include the nutrients that we have identified as being depleted in the average diet, plus glucosamine, which has an important role to play in the maintenance of connective tissue. This strategy of 'combination nutrition' represents the next wave of health care: preventative health care which, I believe, can make the degenerative diseases a rarity.

Micro-nutrients at Suggested Daily Amounts (SODA) will counter-balance the effects of ageing.



## But how much?

### The Suggested Optimum Daily Amount

We have an indication of which nutrients need to be boosted in our diet. But we still need to answer the question: "What are the optimum levels of these nutrients to maintain optimum health, rather than the minimum levels to prevent deficiency disease?"

One version of this measure is called the SODA – Suggested Optimum Daily Amount. From surveys of healthy diets and much other evidence, I have calculated SODAs for all the nutrients needed to maintain our defences – and therefore cut the risk of heart disease, strokes, certain cancers, Alzheimer's and other major diseases. They are on page 20.

## Closing the gap

The following table, though incomplete, shows how significant the problems of multiple micro-nutrient malnutrition ('Type B Malnutrition') are. It also shows what health benefits we can hope to achieve through better diet and supplementation; and why these can only be achieved through comprehensive nutrition.

## Defining the ideal supplement

Whilst the basis of every healthy diet is the sort of food I have defined throughout this booklet, I am also sure that even this does not constitute optimised nutrition.

However, by taking the difference between the average daily intake of the key nutrients and my Suggested Optimum Daily Amounts (SODAs), we can begin to define what should be in an ideal supplement.

Nutrient	Average daily UK intake <sup>1</sup>	Suggested optimum daily amount <sup>2</sup>	Supplement level	Health implications if intake is optimised
Vitamin C	58mg	550mg	500mg	Reduced risk of heart disease/stroke, cancer, diabetes and skin ageing
Vitamin D	2.9mcg	at least 20 mcg	20 mcg	Improved immune function and reduced risk of auto-immune disease
Vitamin E	9.3mg	110mg <sup>3</sup>	100mg	Reduced risk of heart disease/stroke, cancer, diabetes and skin ageing
Vitamin K	45mcg	95mcg	50mcg	Reduced risk of osteoporosis
Selenium	35mcg	185mcg	150mcg	Reduced risk of cancer and heart disease
Chromium	30mcg	150mcg	120mcg	Reduced risk of diabetes
Beta carotene	2mg	9mg	7mg	Reduced risk of heart disease, cancer and skin ageing
Lycopene	2.5mg	7.5mg	5mg	Reduced risk of heart disease, cancer and skin ageing
Lutein	1.5mg	7.5mg	6mg	All the above and reduced risk of blindness
Betaine	25mg	450mg	425mg	Reduced risk of heart disease/stroke, cancer and Alzheimer's
Omega 3	150mg	750mg	600mg	Reduced risk of heart disease/stroke, cancer and Alzheimer's
Flavonoids	140mg	400mg	250mg	Reduced risk of heart disease/stroke, cancer, diabetes, osteoporosis and skin ageing
Isoflavones	5mg	45mg	40mg	Reduced risk of cancer, Alzheimer's and osteoporosis
Co-Q10	10mg	30-60mg	30mg	Reduced risk of heart disease and premature ageing
Glucosamine	0mg	500mg	500mg	Reduced risk of osteoarthritis
Curcumin	n/a <sup>4</sup>	500 mg	500mg	Reduced inflammation

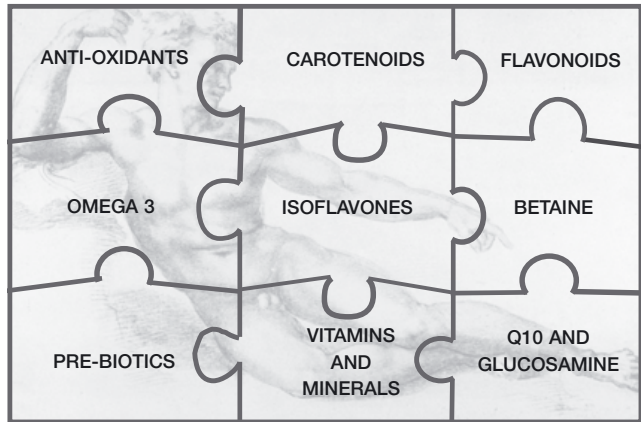
1 Sources: Council for Responsible Nutrition plus government and trade sources.  
 2 Calculations based on population studies and my survey of clinical trial data.  
 3 As mixed tocopherols.  
 4 For reference 60-200mg (India)



## Completing the nutritional jigsaw

The nutrients you need to protect yourself from each main disease provide a series of overlapping lines of defence.

Each bit of the defence strategy affords some protection, but unless you have all the defences in place you remain vulnerable. The nutrients can also be visualised as pieces in a jigsaw. To get



the fullest protection all the pieces need to be in place.

The basic source of the nine pieces in the nutritional jigsaw must be a healthy diet. So start with a diet rich in fruits, vegetables, soy, oily fish, wholegrains, herbs like thyme, rosemary and oregano, and spices like turmeric, garlic and ginger.

But even a healthy diet needs an additional core of supplements in order to reach the optimum nutritional levels.

Add some moderate daily exercise, reduce stress, get adequate sleep, stop smoking (if you haven't already done so), and now your repair mechanisms should be working as they were designed to do, to keep you well.

## High dose single nutrients can be dangerous – combination is the key

Although the average diet contributes well below the optimum level that many leading researchers have defined, I do not believe in taking high doses of single nutrients, which can be dangerous. Food contains a range of nutrients that combine with each other and work synergistically. It is this combination and synergy which exert the positive effect on health.

In the same way, I believe that a nutritional supplement should combine a full range of the most protective nutrients if it is to have a real impact on health.

## References

A full list of references that support this introduction is included in the Health Defence book.

## Avoiding 'Pharmageddon'

Prevention is indeed better than cure. Of course we all want to avoid illness, but the value of prevention is underlined by the fact that pharmaceutical drugs can have serious side effects. Indeed, adverse drug reactions (ADRs) are now a significant cause of death.

The language of pharmaceutical drugs is that of warfare – their role is to fight, oppose, interrupt and kill. And they work well when their target is a simple, single-cause, invading infection – in the way that antibiotics kill bacteria.

But today's health threats are complicated, multiple-cause degenerative diseases. And I believe the best defence against this type of disease is to support the body's own natural capacity to heal and regenerate itself.

## Website update

I have tried to incorporate the very latest research on nutrition and health available at the date of publication of Health Defence.

Inevitably, however, important new data is appearing all the time. Consequently, I am making free updates available on my website:

[www.drpaulclayton.com](http://www.drpaulclayton.com)

## Summary

Food and nutrients, at the right levels and in the right combinations, together with regular exercise, adequate sleep and reduced stress, can literally alter the body's chemistry away from incipient disease and back towards health. They can extend the period during which wear and tear are in balance.

And by achieving that, cut the risk of disease and slow the ageing process.

Dr Paul Clayton, 2010



# A unique combination of nutrients to support long term health

Designed by a leading health scientist



**univite**  
**NutriShield**  
THE ALL-INCLUSIVE SUPPLEMENT  
[www.nutrishield.com](http://www.nutrishield.com)

## A strong immune system is the best defence against health threats



CONTAINS  
Wellmune WGP™  
1-3, 1-6 beta glucans

**univite**  
**IMMUNOShield**  
[www.immunoshield.com](http://www.immunoshield.com)

## Helps maintain healthy and supple joints



CONTAINS  
Glucosamine  
Curcumin  
Vitamin K

**univite**  
**JOINTShield**  
[www.jointshield.com](http://www.jointshield.com)

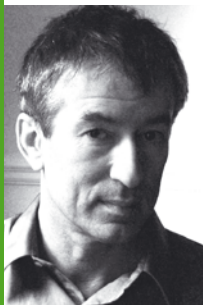
## About this introduction

An *Introduction to Health Defence* has been produced to give the reader an insight into the main arguments set out in Dr Paul Clayton's groundbreaking book, *Health Defence*.

Health Defence is a 'must read' for anyone interested in staying healthy, whatever their age. Today the main threat to a long, quality life is from degenerative disease – heart disease, cancer, stroke, osteoporosis, diabetes and Alzheimer's. Dr Clayton shows how it is entirely possible, through enhanced nutrition, to protect yourself from each one of these threats. And in so doing, even help slow the ageing process.

### The author, Dr Paul Clayton

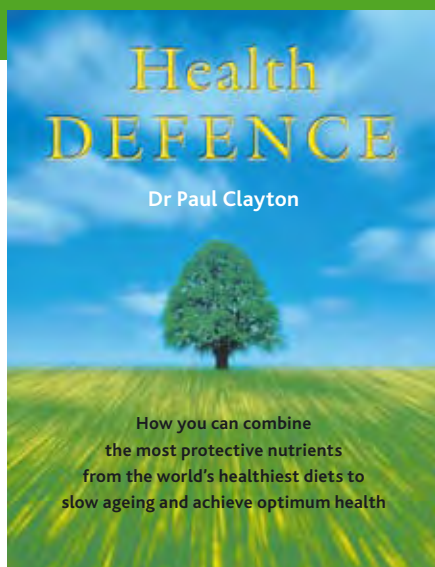
Dr Paul Clayton is a previous Chair of the Forum on Food and Health at the Royal Society of Medicine.



Dr Clayton graduated summa cum laude in Medical Pharmacology from Edinburgh University, prior to obtaining his PhD.

He is a former Senior Scientific Advisor to the UK government's Committee on the Safety of Medicines and lectures in nutrition at the Royal College of Physicians. He is Visiting Lecturer on Nutrition at Oxford Brookes University. He frequently presents at and chairs international conferences on nutrition and health.

Dr Clayton has worked with leading doctors and clinical scientists at centres of clinical expertise in the UK and abroad, and trained the pharmacists in Britain's largest chemist chain in preventative nutrition. His books include *Health Defence* and *After Atkins*.



*"This is a fascinating and immensely readable book."*

Jonathan Edwards, Olympic Gold Medallist

*"An invaluable resource for all who wish to maximise their quality of life."*

Maurice Hanssen, author of 'E for Additives'