An Introduction

to

HEALTH DEFENCE

by

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HEALTH DEFENCE : An Introduction

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 77 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 my book "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.

For example, the relative immunity of the Mediterrranean 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.

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 fur 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*).

Why prevention is (much!) better than cure

Five out of six 60-year-olds already have one or more of the chronic degenerative diseases, such as coronary artery disease, arthritis, osteoporosis, Alzheimer's, or cancer.

Many of these people will not know that they have the disease – because it has yet to become noticeable.

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.

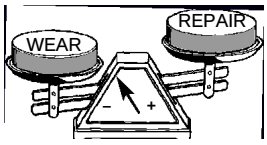
Conventional medicine waits for something to go wrong and then tries to suppress that particular symptom with 'magic bullet' drugs. These chemicals, with which the body is not familiar, carry a high risk of side effects.

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

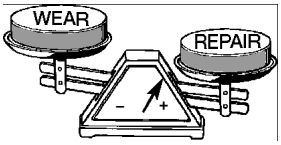
It aims to gently boost your body's own repair mechanisms and defences against hostile environ-mental factors – such as pollution, stress, bacteria, free radicals, toxins, carcinogens, and viruses.

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

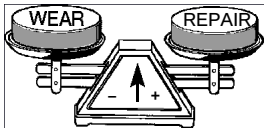
BALANCING WEAR AND REPAIR



More wear than repair → **disease**



Less wear than repair → **healing**



Wear balanced by repair = **health**

Coronary artery disease, cancer, Alzheimer's 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, the majority of apparently healthy people over the age of 40 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 is it inevitable? 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 corrects 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*.

It's a question of balance

All biological tissues are dynamic. Their apparent constancy disguises a constant state of flux, with the processes of decay and regeneration– wear and repair – going on at the same time in your trillions of cells. Bones are constantly being built up and worn away, as are joints. Atheroma is constantly accumulating inside the arteries, and just as constantly being removed.

If the processes are in balance the tissue remains intact, and good health is sustained. But if the rate of decay is only a little faster than the rate of repair, there will be a net loss of healthy tissue, a pre-illness growing little by little every day until the clinical illness finally emerges.

This is why we sicken and die prematurely; in almost all of us, the repair mechanisms are below par and the processes of decay in overdrive. And the balance of evidence shows that, in the majority of cases, this is due to multiple micro-nutrient depletion. Sub-optimal nutrition denies our repair mechanisms the nutritional support they need.

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

VITAMIN INTAKES

US DEPARTMENT OF AGRICULTURE (USDA) SURVEY 1994

Vitamin	A	E	C	B1	B2	Niacin	B6	B4	B12
% Population Depleted	55	68	37	32	31	27	54	34	17

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 (RDAs) 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 three threats to your health that most contribute to disease – a weakened immune system, free radical damage and inflammation.

The three main threats to your health

Apart from any genetic factors, which affect relatively few, there are three principal and quite different threats to your health.

1 **Invasion by disease-causing pathogens** like bacteria and viruses, or by cancer cells, formed when cells grow out of control. The immune system is the major defence against both pathogens and cancer cells.

2 **Attack by destructive free radicals**. Anti-oxidants are your major defence against this dangerous process.

3 **Inflammation**. Recent research has shown that a primary cause of high blood pressure, heart disease and stroke is chronic inflammation of the lining of the arteries – almost certainly more important than raised cholesterol. Inflammation of the bronchial airways is also a root cause of asthma and is involved in arthritis and certain cancers.

Multiple depletion

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

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 kill bacteria, 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, E, and vitamin D especially, plus the B vitamins, the minerals zinc, copper, manganese, iron, selenium, chromium and others.

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.

However, Professor Ranjit Chandra at the Johns Hopkins University in Baltimore showed that the cause of the weakened immune system, so common in the elderly, was **not** old age. It was because the elderly are depleted in almost all the key nutrients.

He gave his elderly subjects a daily nutritional supplement. Within 12 months their immune systems had rejuvenated. Moreover, the number of days they were ill was reduced by an amazing 50 per cent.

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. Fortunately you can redress that balance.

This is not the absolute absence of a single nutrient that causes a deficiency disease (as when the absence of Vitamin C causes scurvy), but sub-optimal levels of many nutrients, which slow a restorative process by a mere percent or two. That is enough to lead, over a period of years, to debilitating or fatal illness.

Drugs cannot remedy this syndrome of multiple micro-nutrient depletion leading to illness. Only well-designed nutritional programmes, specifically assembled to support regenerative function and slow the processes of decay, can do it.

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.

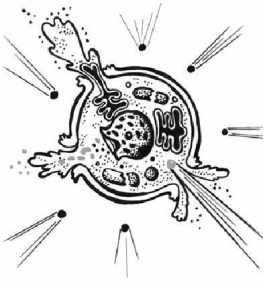
Lifestyle influences

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.

Defeating Free Radical attack

The second major threat to our health is from free radical damage. Free radical damage is involved in most of the diseases which ultimately kill us. And it is deeply involved in the ageing process.



An unprotected cell being attacked by free radicals

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 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.

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.

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 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 work together, which is why you need a comprehensive range of anti-oxidants, as diagrams on the following two pages show.

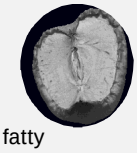
The conclusion, therefore, is that we need a wide range of anti-oxidants and we need them in the right amounts.

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

But herbs and other plant compounds, like thyme, ginger, garlic, ginseng, liquorice, chilli, paprika, cocoa, green tea, turmeric (the yellow spice in curry), all contain powerful anti-oxidants. In addition red wine also contains powerful anti-oxidants – as do grapeseed, grape juice and dark chocolate.

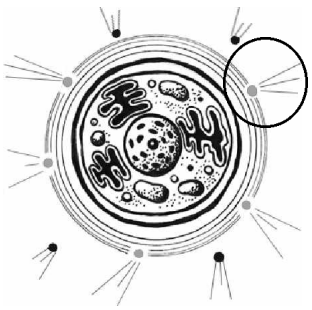
A common phenomenon

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.

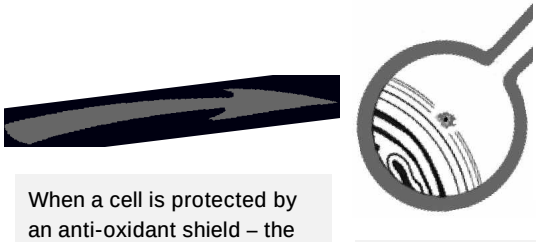


When the fatty acids in body cells are oxidised by free radicals, they form, among other things, lipofucsin. In skin, lipofucsin forms so-called liver spots which are unsightly.

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



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.

The anti-oxidant protection offered by foods (and supplements from food sources) can now be measured in ORACs (standing for **O**xygen **R**adical **A**bsorbency **C**apacity) 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. The standard one-a-day vitamin and mineral pill 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 a level of over 4,500 ORAC units a day. Combined with a realistic and healthy diet they would bring you to an optimum level. Indeed, I estimate they would put you in the top 1% of healthy diets on the planet.

ORAC Units

The world-famous Tuft's University in Boston, measures the anti-oxidant protection provided by foodstuffs in ORACs.

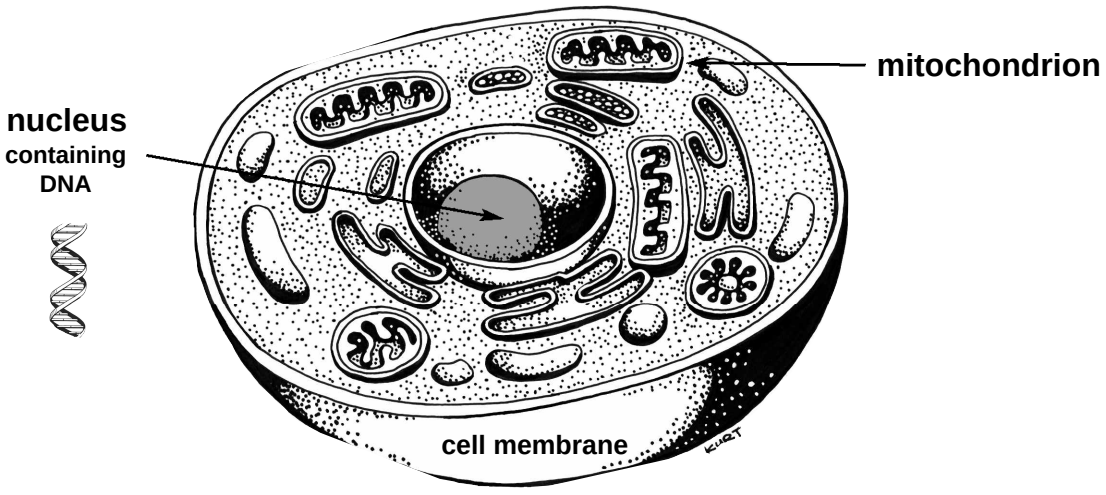
Typical diets provide 1,400-1,500 ORACs a day: optimal intakes are estimated to be 3-5,000 ORACs. To achieve that, you would need to eat 10-15 servings of fruits and vegetables a day – or add a high ORAC-scoring supplement to your diet.

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.



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.

How anti-oxidants protect your cells cont

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, as 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.

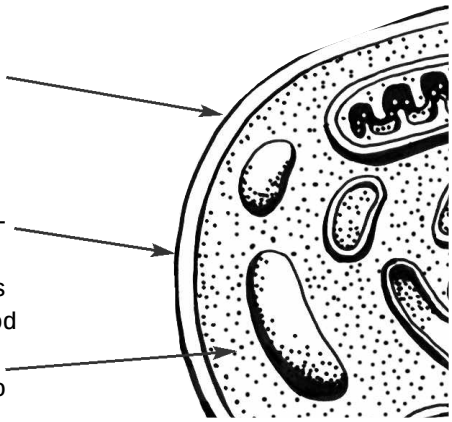
In addition, certain anti-oxidants only function properly in combination with other anti-oxidants. Vitamin E and carotenoids protect fats in your body from oxidation – but only if sufficient Vitamin C is present. And mixed tocopherols are more effective than simple vitamin E.

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.

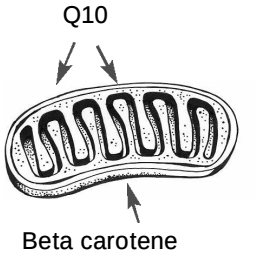
So you cannot protect with a single anti-oxidant. Only a full range can offer comprehensive cover.

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.

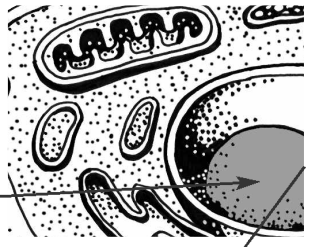


8 Large amounts of free radicals are produced in the mitochondria. Q10 acts inside the mitochondria, and beta carotene protects the mitochondrial walls.



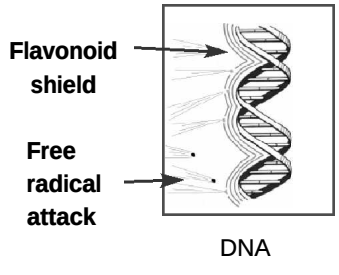
9 Anti-oxidant enzymes neutralise free radicals in almost all areas. They depend on adequate trace elements (see column on left).

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.



A well-balanced, nutritionally deficient diet

At medical school I was taught that you could obtain all the nutrition needed from a well-balanced diet. After all, we evolved without vitamin pills.

I am now convinced, however, that anyone over the age of 40 needs a comprehensive 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.

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 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.

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, sunbathing, pollution, excessive drinking or exercise, all deplete the body of anti-oxidants.

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

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.

Importance of chewing

We have even forgotten how to eat. Studies show we obtain fewer calories and nutrients from soft food than from crunchy food we have to chew.

Unchewed food is hard or impossible to digest, so its calories and micro-nutrients pass through our systems.

The less you chew fruits and vegetables, the less their micro-nutrients are released for absorption.

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.

The initial study on requirements for Vitamin C was carried out on six convicts for a mere nine months – and two convicts escaped before the study was complete!!

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

RDAs are not enough

The way we live makes it impossible to obtain all the nutrients we need 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, they 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.

Vitamins C and E

A recent and very powerful study showed that a daily intake of 180mg 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 down to the average daily intake of Vitamin C, which is 58mg. The RDA for Vitamin E is an absurd 10mg; the average Western intake of this essential micro-nutrient is, conveniently, 9.3mg.

Reduced intake of Omega 3 oils

Intake of Omega 3 poly-unsaturated fatty acids has fallen by an estimated 75% since Neolithic times.

Omega 3 oils

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

Fatty acids, like Omega 3, are also critical building blocks for brain function and to reduce the risk of mental decline in the older years.

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.

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, 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 probable optimum intakes. (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.

Isoflavones

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

Betaine

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

Reduced selenium

Grains are the main source of selenium. Intake has fallen by 50% in the last fifty years.

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.

Pre-biotics

Reduced pre-biotics

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

Pre-biotics are the non-digestible fibres – sometimes called fermentable fibres – found in Jerusalem artichokes, onions and oats (see *Health Defence* chapter 7). They too have immuno-strengthening properties because they encourage the growth of healthy 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 the RDAhas not yet been agreed.

Curcumin

Curcumin is a powerful anti-inflammatory, so it is an important nutritional ingredient in the fight against many degenerative diseases. Interestingly people whose diets include high levels of curcumin (which is derived from turmeric) appear to have a low incidence of Alzheimer's.

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 die. It is little to do with ageing, 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 a car it eventually breaks down. So do people!

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.

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.

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.

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.

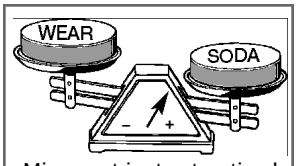
It should include the nutrients that we have identified as being depleted in the average diet, plus glucosamine, which has an important role to play in the maintenance of connective tissue.

This strategy of 'combination nutrition' represents the next wave of health care; preventative health care which, I believe, will make the degenerative diseases a rarity.

But what levels?

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.



Micro-nutrients at optimal levels will counter-balance the effects of ageing.

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.

Nutrient	Average daily UK intake*	Suggested optimum daily amount** SODA	Supple-ment level	Health implications of optimum intake
Vitamin C	58mg	550mg	500mg	Reduced risk of heart disease/stroke, cancer, diabetes and skin ageing
Vitamin E	9.3mg	110mg***	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 kin ageing
Lutein	1.5mg	7.5mg	6mg	All the above and reduced risk of blindness esp. AMD (age-related macular degeneration)
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
Curcumin	20 mg	500mg	500mg	Reduced risk of blood pressure, asthma and arthritis
Co-Q10	10mg	30-60mg	30mg	Reduced risk of heart disease and premature ageing
Glucosamine	0mg	500mg	500mg	Reduced risk of osteo-arthritis

* Sources: Council for Responsible Nutrition plus government and trade sources
** Calculations based on population studies and my survey of clinical trial data
*** as mixed tocopherols

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 exercise, 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.

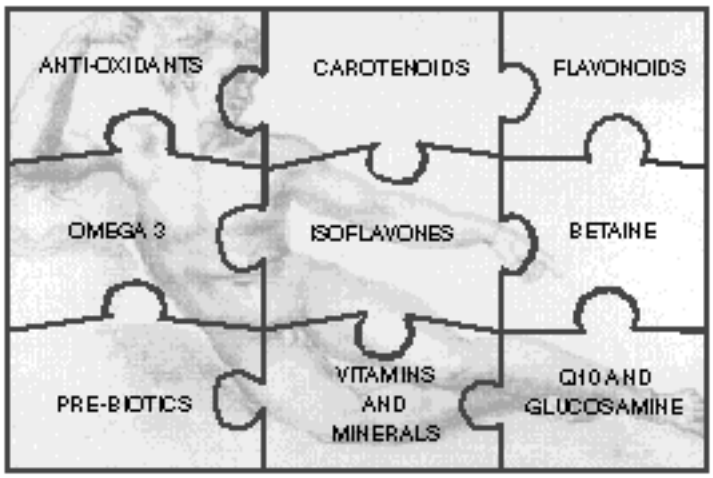
Website update

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 the following website where you will also find my recommendations for the specific levels of each of the key nutrients

www.drpaulclayton.com

Note: Afull list of the research material referred to is included in the *Health Defence* book.



Never too late

The focus of these nine lines of defence, or nine pieces in the jigsaw, is on preventing degenerative disease in the first place.

However, the same basic nine-step nutritional plan is valid even for people who have already started to exhibit some symptoms of incipient disease. In addition to a physician's care, you will find advice on additional nutritional strategies for specific diseases in the rest of the *Health Defence* book.

Research shows that the nutritional healing approach based on SODA levels and focused on maintaining 'wellness' can work wonders. It can dramatically reduce the risk of disease; it can open blocked arteries, improve a failing immune system, speed up the body's ability to heal wounds and repair arthritic joints. It can increase energy, raise intelligence, and improve mood. And it can do more.

Healthy life extension is no longer over the horizon. It's here.

Final wor d

Since the first edition of Health Defence I have been asked by numerous readers if there is a nutritional supplement that meets my criteria. I have now designed one for a British nutrition company and details can be found at www.nutrishield.com.

Your own copy of *Health Defence* plus a FREE cookbook

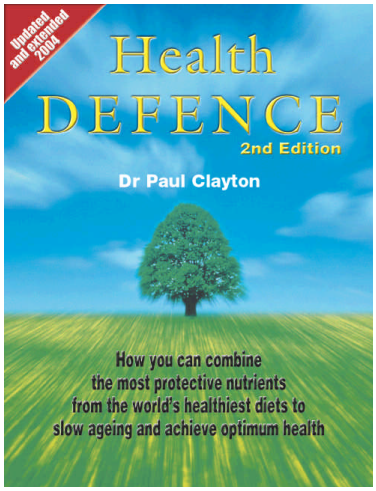
We hope you enjoyed this *Introduction to Health Defence*. If so we feel sure that you will want to read the book itself.

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

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

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

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



"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

"Awell 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

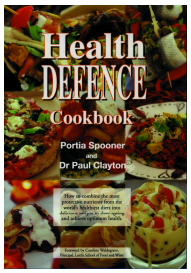
"An invaluable resource for all who wish to maximise their quality of life."
Maurice Hanssen Author of *E for Additives*

"Atruly 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

FREE with *Health Defence*



"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

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