

The immune system is a highly evolved series of defences against invading organisms and cancer cells

It is a system which must be constantly on the alert

Lack of nutrients, stress and pollution are all factors that can impair the immune system

Many vitamins, minerals and micro-nutrients are essential for immune system function

Stress depresses the immune system – relaxation techniques and adaptogens such as ginseng can enhance it

Over-exercise depresses the immune system – the amino acid glutamine can prevent this.

Inequalities in society lead not only to worse health for the poorest, but to poorer health and shortened life expectancy for the nation as a whole

Chapter 3

Inner defences – the immune system

Some people never seem to fall ill, while others come down with coughs and colds every time there's a bug in the neighbourhood. Some individuals live long and healthy lives, but others wither and die in middle age.

Luck? Not entirely. Luck or genetics may play a part, but the important difference is that the lucky ones have better defences against the two most important threats to health: invasion by foreign organisms and attack by dangerous free radicals.

These are two quite different kinds of threat and to counter them we need two quite different forms of defence. To protect against invading micro-organisms we depend on an efficient immune system. And to neutralise destructive free radicals, we need a well-designed anti-oxidant shield.

This chapter looks at the immune system, a highly complex, many-layered defence mechanism. It is designed to protect us, both against the teeming hordes of micro-organisms (bacteria, viruses, parasites and fungi) that see us as food and shelter; and against our own cells that have become cancerous.

The immune system's outer defences consist of millions of free-ranging cells which circulate the whole body, constantly on the lookout for invaders. These cells are pumped round the body in

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the bloodstream and are drawn back to the heart via the lymphatics – a network of small vessels, rather like veins, that drain through lymph glands in the neck, groin and under the armpits before emptying back into the bloodstream.

If the cells spot an invading bug on their rounds, they bring it back to the lymph glands where other immune cells swing into action.

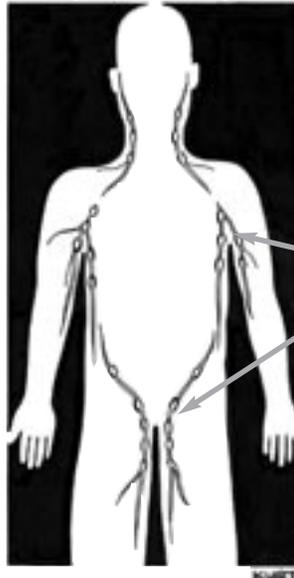
The immune cells multiply (which is why swollen lymph glands are a sure sign of infection) and release special molecules called antibodies. These search out the bugs and stick to them like glue. This is enough to stop some invaders altogether, but the immune system can also send in the back-up troops – killer cells which zoom in on the combination of 'bug plus antibody' and gobble them up.

Most of the time, very little gets past these defences. Most of the time, despite living in an environment full of potentially disease-causing organisms and carcinogens, we remain healthy.

Problems occur, however, if our immune system is overwhelmed – and that may be an increasing danger. There has been an increase in external threats to our health, including environmental pollution, smoking, viruses which attack the immune system (such as HIV) and the growing use of immunosuppressant medications. At the same time, there has been a decline in our intake of vital micro-nutrients. The daily intake of selenium, for example, has fallen by half in Britain since the '40s.

New cases of cancer have increased significantly and, unless we change our ways, the figures may continue to worsen. So what should we do to reduce our risk of premature illness? And how can we strengthen our immune systems?

Lymphatic system



LYMPH GLANDS

Wearing down the defences

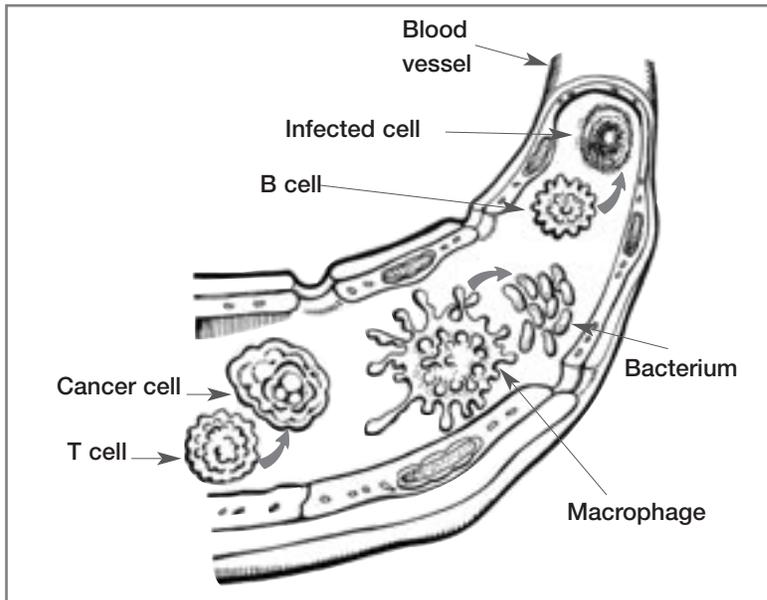
Some pathogens, such as HIV, are so dangerous because they can break down our defences. Similarly, if the body is consistently exposed to high levels of carcinogens, as in smoking or excessive sunbathing, and if the immune system is impaired by stress and/or poor nutrition, then eventually a cancer will break through.

Increased cases of cancer

New cases of cancer rose by 10% in Britain between 1979 and 1989 alone^(Dept. of Health data).

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YOUR BODY'S DEFENCE SYSTEM



Boosting the defences

There are three major elements that can affect our immune system: nutrition, our psychological and emotional well-being, and, unexpectedly, the kind of society we live in. Each of these elements can be manipulated to enable us to live healthier, longer lives.

The diagram above shows B cells, T cells, and macrophages dealing with bacterium, cancer and infected cells.

B cells produce antibodies which destroy infected cells. T cells and natural killer cells destroy cancer cells. Macrophages surround and 'gobble up' bacteria. All these defence cells need vitamins, minerals and other micro-nutrients in order to function well.

Supplementing the immune system

The immune system needs well over 20 different micro-nutrients to function properly. Dieting is an all-too-common cause of increased vulnerability to infection, not only because calorie restriction results in a general slowing down of the metabolism, but also because many diets lead to micro-nutritional depletion.

Under attack

It is thought that cancers start to grow relatively frequently in our bodies.

They don't, for the most part, become a problem. This is probably because the immune system spots that the cells are different, reacts to them as if they were foreign, and dispatches killer cells to nip the cancer in the bud.

Even a well-balanced full-calorie diet is unlikely to provide optimal amounts of all of the essential micro-nutrients. As we saw in Chapter 2, this is even more important in middle and old age, when malnutrition is probably the main cause of a faltering immune system.

A number of studies have now shown that supplements of vitamins and minerals can improve immune function, particularly in the elderly where micro-nutrient depletion is more common⁽¹⁹⁻²⁶⁾. Vitamin E and the carotenoids are important, but a well-balanced, broad spectrum vitamin and mineral formula is likely to be more effective. However, there's more to supplementation than vitamins and minerals.

There's a wealth of research into natural products which have the ability to support and strengthen the immune system, including such well-known herbs as Siberian ginseng (*Eleutherococcus senticosus*), and the sterols found in foods such as sesame seeds. Researchers are not yet completely clear as to *how* they work, but there is a general agreement that they *do work* (see Chapter 19, Asthma).

HERBAL IMMUNE SYSTEM BOOSTERS

Eleutherococcus (Siberian ginseng) has a variety of beneficial effects, which have been frequently described in the scientific journals⁽⁸⁰⁻⁹³⁾.

It is an adaptogen, which means it helps people cope with stress. The Russian cosmonauts took the herb to help them with their gruelling training and the rigours of working in space.

This herb also has positive effects on the immune system. It is widely used to counteract infections such as flu and the common cold, and to speed recovery from infection. (*Eleutherococcus* and *Echinacea*, another powerful herb, can squash the beginnings of flu overnight.)

In healthy people, *Eleutherococcus* raises the levels of T-Helper cells and Natural Killer cells in the blood stream; and boosts levels of the immune substance gamma interferon. It also blocks the immuno-suppressant action of the stress steroid hormones. All these changes are important in warding off infection⁽⁹⁵⁻¹¹⁹⁾.

Eleutherococcus also contains anti-oxidants, which is why it is used in Eastern Europe to reduce the side effects of cancer treatment (see Chapter 5, Anti-oxidants). Then there are shiitake mushrooms, which contain polysaccharides that can boost elements in the immune system. The same polysaccharides are found in the skin of pears, so these are also worth considering⁽¹⁾.

Extra ingredients for a healthy immune system

- Micro-nutrients: vitamin/mineral supplement – for general support
- To prevent immune overactivity – sterols and sterolins from sesame seeds or scallops
- Adaptogen: ie Siberian ginseng – if suffering from stress
- Glutamine – especially for athletes or after trauma
- Stimulants: *Echinacea*
OR
Shiitake mushrooms
OR
Pears

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Mind and Body

Everybody knows that when times are really tough, and you're stressed beyond endurance, you're more likely to fall sick. But why does the body suffer just because the mind is under pressure? What's the connection?

Chronic worries, repressed anger and depression have all been shown to impair the workings of the body's immune defences by reducing the ability of immune cells to form antibodies, by slowing down the killer cells and by interfering with coordination between the various immune cell types.

The end results can include insufficient immune responses and possibly even auto-immune problems where the immune system attacks the body itself.

Wound healing is also slowed by stress. A recent study in the prestigious *Lancet* journal demonstrated that in people suffering from psychological stress, wound healing is slowed by up to nine days or longer, compared to non-stressed individuals⁽²⁾.

Many of the Eastern religions have emphasised stress-reduction (via techniques such as meditation) as a key to health for centuries. Modern science is in full agreement with this.

Society

If you want to develop your immune strength to the full, you have to step outside your own door and take a critical look at the society you are a part of. Social status, job security, and even 'social inequality' have an important and direct influence on your life and health.

To begin with, you're better off if you're better off. In class-conscious Britain, socio-economic gradients exist for nearly every chronic illness and disability⁽⁴⁾. The lower down the social scale, the higher the rate of infant mortality⁽⁷⁾, childhood death⁽⁶⁾, and serious illnesses in adult life⁽⁵⁾.

Blue-collar workers are twice as likely to get angina as white-collar types⁽³⁾ and two to three times more likely to die of heart disease or cancer than their non-manual contemporaries⁽⁸⁾. In fact, nearly all the main causes of death are more prevalent, which is why the least privileged have shorter lives than their

Are you stressed?

It's not always easy to tell, because one of the first things to go is your sense of judgement. But the odds are you're suffering from stress if you:

- Get irritable and short-tempered
- Lose your sense of humour
- Burst into tears at inappropriate moments
- Start sleeping badly
- Start smoking (again!)
- Are drinking more than usual
- Are eating far more (or less) than normal.

social betters: they lose out by a startling eight years, roughly 15 per cent of their lifespan.

In the USA, the latest research from the National Centre for Health Statistics shows a depressingly similar pattern – and it's getting worse. Although there was an overall decline in death rates between 1960 and 1986, the health gap between rich and poor grew steadily wider.

Other countries show a similar pattern of poorer health among the poor, but the health difference between the classes is often far less than it is in Britain or in the USA.

Wealth alone does not confer health. Within the developed world, life expectancy in the richer countries is no greater than in poorer countries. Higher living standards do not result in longer life. The one factor that does relate to increased life expectancy is greater social and economic equality.

Could something as abstract as social inequality really damage your health? The evidence strongly suggests that this is indeed the case. If you take one country and make things more unequal, the health of that nation suffers as a result.

This has happened in Britain since the mid 1970s. The policies of the Thatcher and subsequent Labour Governments have increased social inequality: the rich got richer, and the poor got poorer^(27, 28). Even though the average British income increased by more than a third in the years between 1979 and 1990, death rates for men and women under 45 showed no decline – against the general trend. Indeed there was a marginal increase. This increase in death rates could not be caused by any simple dietary factor, because practically all the main causes of death showed an increase.

And so did many other signs of people in distress: crime, depression, suicide, addiction, falling scholastic standards and family break-up, road rage, air rage, etc.

This is not an isolated finding. These signs of social problems and weaknesses usually rise and fall in parallel with the health figures. That's the second clue; and it was at Sussex University's Trafford Centre for Medical Research that Dr Richard Wilkinson, who had been studying this conundrum for 20 years, made the breakthrough⁽¹⁸⁾.

Does wealth buy health?

If you look through 17th- and 18th-century British navy recruiting records, a disturbing pattern emerges. The men aged, or wore out, more quickly than the officers – so much so, that each generation of officers typically outlived two generations of seamen.

The combination of stress, adverse working conditions, drink, disease and malnutrition accelerated the ageing process – a seaman was old at 40 and few reached 45. The officer on the other hand, unless killed in action, might celebrate his 60th or even 70th birthday still in service.

Family doctors who work in deprived areas confirm that by the time their patients reach their mid-40s the signs of degenerative illness are all too often present: damaged and diseased hearts, lungs, livers and kidneys, high blood pressure, raised cholesterol, poor dentition and so on.

In affluent suburbs, the ageing process runs from 10 to 20 years more slowly.

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His studies confirmed that the countries with the longest life expectancy are not the richest countries; people live longest in countries such as Sweden, Iceland and Japan, where there is the greatest social equality, and the least spread of incomes. This has relatively little to do with better social services in more egalitarian countries; instead, it is closely linked to income distribution⁽¹⁸⁾.

Mixed results in the UK war on cancer

The total number of new cases of cancer rose by 10 per cent between 1979 and 1989.

The largest increases were in cancers of the skin (which doubled), bladder and kidney (which rose by a third), and certain cancers of the blood and lymphatic system.

Lung cancer in women rose by nearly half, and cases of early-stage cervical cancer doubled.

The only bright spot was that the incidence of stomach cancer fell, probably due to an increased intake of fruit juices, rich in Vitamin C.

Lung cancer in men fell also, due to anti-smoking campaigns.

(UK Government figures)

HOW THE MIND AFFECTS THE BODY

Exploration of the mind-body link is a science known as psychoneuro-endocrinology. (Psycho = mind; neuro = nerves in the brain and elsewhere; endocrinology = the hormones controlled by those nerves.)

As this new science advances, it's becoming clear that the reason why long-term stress kills is that it damages the cardiovascular system, the digestive system, the hormonal system and the immune system amongst others.

One example of the mind-body link is seen in depression. The mental state of depression is linked to changed activity in the nerves in a part of the brain called the hypophysis.

During depression, the nerves stimulate the hypophysis to release more of a hormone called ACTH. This hormone increases the activity of the adrenal glands, which release more glucocorticoids into the blood. These steroids have various effects, including a weakening of the immune system, and are linked to an increased risk of osteoporosis and Alzheimer's disease.

Stress is also linked to heart disease. The effects of stress include an increase in blood sugars and lipids and an increase in blood pressure: all of which, if sustained, are considered to increase the risk of coronary artery disease.

Your immune system and general health will benefit if you practise a few tried and tested stress-busting routines.

The Health-Utopia equation

How can living in an unequal society affect your health? You would expect the national health average to be brought down by the poorest of the poor, the underclass, people living meagre and shortened lives in the inner cities. However, the shortened life expectancy in unequal societies affects over half the population.

According to the best evidence we have, this is due to widespread immuno-suppression (depressed immune systems) which in turn lead to increased infectious illnesses, and contribute to an increase in cancer.

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So what is the most important cause of immuno-suppression? The answer is almost certainly stress. Stress isn't related to wealth or poverty so much as relative, or perceived status. For example, in a recent study of many thousands of civil servants, most of whom were middle class and reasonably well-off, there was a pronounced difference in health between the ranks.

The 'monkeys' at the top of the tree were healthier than those on the branch below them, and so on down the career structure to the unfortunate occupants of the lowliest positions, who suffered the worst health.

You might think that the senior executives, the high achievers with heavy responsibilities, would experience the most stress. However, the key factor isn't simply the stress itself, but how you experience that stress.

If you're in a position to do something positive about the situation, there's a sense of achievement – and a reduction of stress. But when you don't feel in control, and can't do anything to resolve the stressful situation, the immune system goes into a nose dive.

In an unequal society, the combination of increased stress and widespread feelings of powerlessness may be the most potent cause of ill health of all. More job insecurity, more unemployment, more house repossessions – the resulting sense of insecurity and loss of control may be more common in the poorer classes, but it spreads to affect the population as a whole.

As job security fades, pension plans evaporate, the health care and educational systems fray; and as the incidence of crime rises, more and more people become affected by insecurity and social unease. As the welfare state shrinks, there is further to fall if something does go wrong. With jobs changing at an increasing rate these pressures are unlikely to diminish.

Nutrition plays a part too, and in urban societies, poorer people undoubtedly eat less well. Scientists used to think the increased risk of heart attacks in the lower socio-economic groups was because of increased consumption of saturated fats and cholesterol; but this has been disproved^(11, 12, 15, 16).



The 'monkeys' at the top of the Civil Service tree are healthier.

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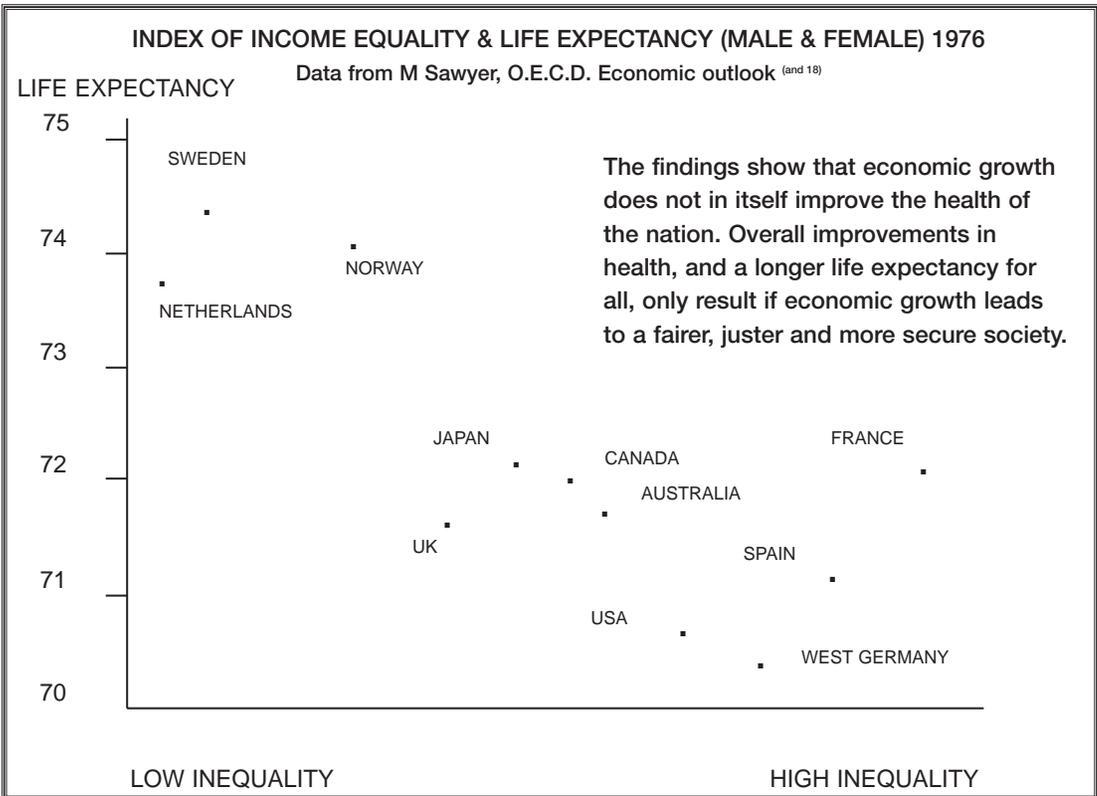
Health & economic growth

Economic growth does not in itself improve the health of the nation.

Overall improvements in health and a longer life expectancy for all only result if economic growth leads to a fairer, juster and more secure society⁽¹⁸⁾.

People living higher up the social scale eat more fats, and more saturated fats, and have higher serum cholesterol levels than manual workers – yet are **less** at risk from coronary artery disease⁽¹⁵⁾. A relative lack of fresh fruits and vegetables in the lower groups' diet is probably far more important^(9, 10); and higher rates of smoking also make a significant contribution.

However, poorer people have additional risk factors unrelated to diet and smoking, such as certain blood-clotting factors⁽¹²⁾, which are thought to be stress-related. This is one way in which stress (especially stress related to lack of control) could lead to an increased risk of heart disease⁽¹³⁾; and how social improvements could lead to a major reduction in coronary artery disease^(14, 17).



SUMMARY

The immune system

- Your immune system is a key defence against external threats such as bacteria and viruses, and internal threats such as cancers.
- Disease breaks out only when your immune system is finally overwhelmed by the attacking organisms.
- The health of your immune system depends upon nutrition, psychological well-being and, it seems, the 'fairness' of the society in which you live.
- You can strengthen your immune system by ensuring you have an adequate range of nutrients; combined, during periods of stress, with an adaptogen such as Panax, Eleutherococcus or Withania (Chinese, Siberian and Indian ginseng respectively); or, during strenuous exercise, with the anti-oxidants and amino acid glutamine.