

Lifestyle and Cancer

The facts



New revised second edition

Foreword by Paula Radcliffe

World champion marathon runner

My mum, although exceptional in many ways, is, I'm sure, similar to thousands of people who have had the trauma of cancer thrust upon them. As well as wanting to make sure she had the best possible medical care and fully understand her treatment options, she had a strong desire to know the best ways to help herself. Day to day questions which seem straight forward before cancer now had an added complexity especially after the



side effects of surgery, radiotherapy, chemotherapy and herceptin started creeping in. For example; What to eat, what not to eat, should I exercise less or more, if so how and where to exercise, would a supplement help, are they safe?

The problem is where to look for these answers? Medicine is similar to sport science in this regard, despite the great benefits of the *information age*; it is still difficult to sort the wheat from the chaff, to know which advice is based on myth and hearsay and which is based on fact and proof. Just as there are hundreds of books explaining how to run faster for longer, there are countless books telling you how to you how to live better for longer. On top of this there are literally thousands of websites, usually trying to sell you something, which claim to have the answer to fighting cancer, ranging from coffee enemas to magnets.

As a cancer expert who has worked closely with patients for many years, Professor Thomas is very aware of the concerns which many patients have, not only with conventional treatments, but with dietary, exercise and lifestyle issues after cancer. I know, from my mum's contact with him during her treatment, that he is sensitive to fact that patients like her need to feel in control and have a strong positive desire to help themselves. As a scientist and a doctor, he has an

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Published by Health Education Publications
Email: health-education@clara.co.uk
Web: www.cancernet.co.uk

ISBN 978-0-9558212-1-9

Papers used by Health Education Publications are natural, recyclable products made from wood grown in sustainable forests.

Graphics by Erika Silling
Photographs by the author or supplied by Unreal Ltd, London.
Proof reading: Great thanks to Mr Michael Vogel and Mrs Cecilia Nicholson

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PART 1

Cancer & lifestyle

Introduction & background



Chapter One

Introduction About this second edition



Like the successful first edition, this book aims to empower individuals with reliable information to ensure they can make the right lifestyle choices. The advice in the next twenty chapters, if followed, will ensure the best possible outcome after the trauma of cancer and its treatments - maximising the chances of living better and longer. This edition has been expanded to include information and advice on cancer prevention so, as well as being an ideal resource for those with a survivorship agenda it is now also highly relevant to anyone concerned about cancer in general.

As far as possible, the information and advice is based only on the facts or, in medical terms, reliable, high quality published research evidence from around the world. For this reason it dispels hearsay and urban myths but instead provides the reassurance and confidence that the efforts required to change an established and often comfortable lifestyle are worthwhile and likely to reap major benefits.

Since the first edition many more studies have been published in international medical journals as the importance of lifestyle is now beginning to be realised by health professionals and academic institutions. These have been included into this edition making it more up-to-date, topical and relevant to the stresses of modern day life. New chapters have been added on quality of life, psychological well-being, complementary therapies and nutritional testing making it bigger, better and more focused on issues which affect people in all aspects of their daily lives, not just those which affect hospital treatments..

Many readers, including patients who have survived cancer, their friends and relatives, have also written with valuable feedback and useful tips. This feedback from individuals from a wide range of cultural backgrounds ranges from the best

ways to exercise, how to communicate with relatives and friends, practical tips such as how to grind linseeds and what happens if you eat too many goji berries! This feedback has also been incorporated into this edition making it even more readable and applicable to individuals from all walks of life. Likewise, if you have any comments of what should be included, expanded or omitted from the next edition please feel free to contact us (health-education@clara.co.uk)

The structure of the book has been simplified to make it more enjoyable and easier to read. It is now split into three main parts:

Part one: The book begins by describing the background to cancer, what causes it, how it is inherited and how environmental and lifestyle factors aid or interfere with our body's ability to fight it and stop it spreading.

Part two: Breaks down the most important specific factors in our lifestyle which influence how we cope with the effects of the disease and treatments and how they influence its progression or relapse. The information within each section has been divided into three categories:

1. **The evidence.** For those of you who don't need to lift up the car bonnet to see how it works, you may wish to move on as this section is rather technical. It summarises the published literature from across the world, describing studies proving the benefits or risks of this or that particular element of lifestyle.
2. **The underlying mechanism.** Again rather technical but describes how the chemical and physical elements of the individual lifestyle interact with cancer, or our bodily processes, to confer a benefit or cause harm.
3. **The everyday lifestyle advice.** This is the real meat on the bones, providing easy to follow practical tips describing the activities of daily living we *should do more of* and what we *should do less of* to stop cancer progressing or relapsing and to improve the overall chance of cure.

Part three: Refers to the symptoms and effects commonly experienced after cancer either caused by the disease itself or the subsequent treatments. For ease of explanation it breaks down these symptoms into specific topics and describes practical tips to relieve them or minimise their effects on the body.

Sample chapter

Chapter Nine

Cancer-forming chemicals

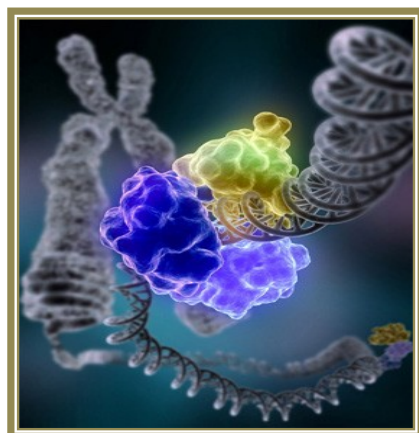
Avoiding carcinogens

The section on antioxidants explained how certain chemicals (carcinogens) can generate superoxide free radicals which damage DNA and rearrange the genes within our cells, leading to the development of cancer. Although patients with established cancer have already sustained the initial DNA damage in order to mutate from benign to malignant cells,



the cancer process can also be fuelled by continuing consumption of foods high in carcinogens. Further DNA damage can encourage the cancer to mutate into a more aggressive type or develop mechanisms to hide from the body's immunological defences. Avoiding carcinogens after cancer is also beneficial as it may reduce the risk of developing further cancers, which are also more likely in patients who may be susceptible from a pre-existing genetic vulnerability, or who have acquired vulnerability caused by chemotherapy or radiotherapy.

There is a wide array of known carcinogens in our diet and probably many others which are unknown. The American Food and Drug Administration (FDA) and similar organisations internationally are responsible for detecting and regulating carcinogens in our diet. They analyse chemicals using cultured cells in the laboratory and in animals. These carcinogenicity studies are subdivided into four broad categories of lesions – gene mutation, clastogenicity, DNA damage and cell transformation. They are legally bound to



share their data with other countries via the Cooperative Research and Development Agreement (CRADA). Of this group of carcinogens the most commonly investigated and discussed are the acrylamides. The evidence for the risks of acrylamides stemmed from a report issued by researchers at the Swedish National Food Administration and Stockholm University in 2002. This reported finding that acrylamides associated with high temperature cooking of carbohydrate-rich foods were linked to cancer.



In animal studies many pesticides are carcinogenic, (e.g. organochlorines, creosote, and sulfallate) while others (notably, the organochlorines DDT, chlordane, and lindane) are tumour promoters. Some contaminants in commercial pesticide formulations may also pose a carcinogenic risk. In humans arsenic compounds and insecticides used occupationally have been classified as carcinogens by the International Agency for Research on Cancer. Human data, however, are limited by the small

number of studies that evaluate individual pesticides. Epidemiologic studies, although sometimes contradictory, have linked phenoxy acid herbicides or contaminants in them, with soft tissue sarcoma (STS) and malignant lymphoma; organochlorine insecticides are linked with STS, non-Hodgkin's lymphoma (NHL), leukaemia, and, less consistently, with cancers of the lung and breast; organophosphorus compounds are linked with NHL and leukaemia and triazine herbicides with ovarian cancer. Few, if any, of these associations can be



considered established and causal, although only a few hundred of the 20,000 chemicals in everyday use have been tested for their impact on health and the environment. Hence, further epidemiological studies are needed with detailed exposure assessment for individual pesticides, taking into consideration work practices, use of protective equipment, and other measures to reduce risk.

A direct link between environmental pollution and cancer in human beings was reported in the Lancet in 2005. Researchers have found that people with high levels of pesticides and chemicals known as organochlorines in their blood stream are far more likely to develop genetic mutations linked with cancer

of the pancreas. The researchers studied 51 patients with pancreatic cancer and compared blood concentrations of the pollutants and the levels of mutation of a gene called K-Ras, believed to cause pancreatic cancer. K-Ras genes have been found to be targets for chemical carcinogens in laboratory studies of animals and this correlates with a more aggressive type of cancer.

A study published in the prestigious Journal of Clinical Oncology in 2010 looked at the blood levels and history of exposure to carcinogens of 623 men with prostate cancer and compared this to 671 similar men without cancer. The levels of carcinogens were significantly higher in the cancer group, indicating that they were a likely contributor to the illness. The risk was particularly high if men already had a genetic susceptibility to prostate cancer as measured by an analysis of their DNA. The carcinogen in question in this study was called Chlordecone (Kepone) a organochloride insecticide with carcinogenic and xeno-oestrogenic properties used extensively between 1973 and 1993 in the West Indies to control banana root disease.

Similar stories from across the world are now emerging and, with expansion of industrial farming methods especially in the Far East and as farmers have to supply food for a rapidly growing world population; the issue is not getting better. A classic example is the production of goji berries, which originally were gathered naturally in the wild by Tibetan monks – organic by default. Now following world demand vast farms have been established in China, many heavily sprayed with pesticides and herbicides and fertilizers to keep up production. It is impossible to avoid carcinogens but here are some examples of the most types commonly present in the west:

- Acrylamides – high temperature cooking of carbohydrates
- Acetaldehyde – manufacturer of acetic acid, flavourings and plastics
- N-nitroso compounds – particularly bloody red meat
- Hydroperoxide, alkoxy and epoxides – heated proteins
- Polycyclic or aromatic hydrocarbons – smoked foods, burnt,barbecued foods
- Allylaldehyde (acrolein), butyric acid and other nitrosamines – heated fats
- Nitropyrene, benzyrene and nitrobenzene – heated oils and smoke
- Methylglyoxal and chlorogenic atractyosides in over roasted coffee
- Pesticides, fertilizers, herbicides – water, crops and vegetables
- Benzene, formaldehyde, ammonia, acetone – alcohol, smoke
- Hydrogen cyanide, and arsenic – smoke
- Lead – exposure industrial batteries
- Diesel exhaust – occupational exposure to commercial vehicles
- Atrazine - widely used as a herbicide

Acrylamides

The most familiar group of carcinogens are the acrylamides, usually generated by cooking or processing, particularly when food is cooked at 117°F (47°C) for three minutes or longer. For example grilling, high temperature oven baking or frying of meat, fats, and starchy carbohydrates such as potatoes (making crisps), chips and baked snacks. The Food and Drug Administration (FDA) regularly analyse a variety of U.S. foods for acrylamide concentrations and publish league tables such as these examples below.



Summary – acrylamide concentrations in common foods (FDA 2010):

Often greater than 1000 ug/kg

- Burnt barbequed meat or fat
- Burnt toast, pizzas
- Veggie chips, potato snacks or potato crisps
- Dry roasted oat or wheat bran crackers

Usually between 500-1000 ug/kg

- French fries / chips
- Processed baked potatoes or hash browns
- Ginger snap cookies, pretzels or sesame/nut snacks or tortillas
- Cream crackers and dried biscuits
- Low fat bruschetta / vegetable crackers
- Dried soup powder

Usually between 200-500 ug/kg

- Butter flavoured popcorn
- Frozen potato skins, corn flaked cereals or corn chips
- Processed prune juice
- Toast not burnt

This table can only be used as a rough guide because the levels of acrylamide (AA) depend not only on the foods we buy and eat, but the individual cooking processes. Boiling meat would have significantly lower levels than frying it for example. The levels of AA may also significantly alter between different brands of the same product by the way it has been processed. To make it clearer, there are now moves to legislate for the introduction of AA labelling on food products.



It must also be remembered that total ingested AA is more important than the concentration within each food. For example, a small quantity of a food with high levels of AA such as a cream cracker is still safer than a large quantity of food with lower levels such as baked potatoes. Furthermore, the level of antioxidants in the same food or meal can also counterbalance the negative effects of the AA. A study from Philadelphia, USA showed that marinating meat in spices such as turmeric and sage before frying can significantly help, as can eating fresh salad and vegetables at the same time.

Xenoestrogens, environmental chemicals

Some chemicals can increase the risk of breast cancer not by directly damaging the DNA, like the acrylamides above, but by having a chemical structure similar to oestrogen. This stimulates breast tissues to grow rapidly and often in an uncontrolled way. These are termed xenoestrogens and are usually environmental pollutants or man-made chemicals. The most common group of chemicals are the



polychlorinated biphenyls (PCB) and organochlorines found in sources which include car pollution, fuels, drugs and polycarbonate plastic baby bottles and food containers. It is difficult to avoid these chemicals in a modern environment as they are ingested in small quantities over long periods of time.

Researchers from five USA academic centres demonstrated that if the same oestrogenic pollutants in our environment are given to laboratory mice, they induce and promote mammary cancers. A further study in 1993 showed that

rhesus monkeys developed a thickened uterus (the first stage to develop cancer) and endometriosis after being fed food that contained dioxin, a xenoestrogen, over a four-year period. Both endocrinologists (specialists in disorders of endocrine glands such as ovaries and testes) and reproductive biologists have suggested that long-term exposure to xenoestrogens might underlie the rise in endometriosis, fibroids, infertility and breast cancer in women. In men, many scientists believe that oestrogenic pollutants are responsible for some disturbing trends such as decreasing sperm count and function and decreasing testosterone production. In the animal kingdom, plastic infiltrating the water supply may explain the shrinking sizes of alligator penises!



disturbing trends such as decreasing sperm count and function and decreasing testosterone production. In the animal kingdom, plastic infiltrating the water supply may explain the shrinking sizes of alligator penises!

Pesticides, fertilizers and herbicides



There are over 350 permitted pesticides allowed in western farming but researches have estimated that more than 70,000 other chemicals have been detected in our food chain, and most of these have not formally been tested for health risks. These pesticides, herbicides, fungicides, fertilizers and industrial pollutants are in our water because of rain erosion runoff from landfills and agricultural lands. Obviously, without them it would have been hard to feed the world, and many are safe, but their use is now geared to over

commercialisation. Some of these, as well as being carcinogenic have also been found to be oestrogenic.

A report published in the International Journal of Andrology has linked pollutant oestrogenic chemicals in mothers' breast milk with an increased rate of testicular cancer in their male children. More specifically, researchers found that Danish men were up to four times more likely to have testicular cancer as men in neighbouring Finland. Investigators measured levels of 121 chemicals in 68 samples of breast milk from women in Denmark and Finland. They found a dramatic difference between the two countries, as Danish breast milk had significantly higher levels of some chemicals, including dioxins, polychlorinated

biphenyls (PCBs) and pesticides, than Finnish breast milk. Why women in Denmark should have more of the chemicals in their breast milk than their Finnish neighbours remains unclear. Nevertheless, this study reinforces the view that environmental exposure to oestrogenic pollutants increases the risk of cancer and also in this case high rates of other male reproductive disorders, including poor semen quality and genital abnormalities.

In addition to hormone related conditions and cancers, such as testicular and breast cancer, animal studies have shown that polychlorinated biphenyls increase the risk of liver cancer and lymphoma by up to 65 percent compared to animals fed a chemical free diet. These chemicals are in our food supply – in plants, animals, fish and grains. They cannot be avoided and of an even greater concern is that switching to a diet with more fruit, salad and vegetables may paradoxically mean higher exposure to pesticides and herbicides unless extra precautions are taken to avoid them.

Smoke from lamps and candles

Burning everyday paraffin-wax candles can emit a multitude of toxic chemicals, including toluene and benzene. While it is nowhere near as harmful to light an occasional candle as it would be, for example, to smoke a pack of cigarettes a day, researchers at South Carolina State University suggest that frequent candle burning in tight, unventilated areas has been implicated in lung cancer, asthma, and skin rash.



Speaking before a chemical society meeting, the researchers explained that the candles, which are made from petroleum, are a source of known human carcinogens and indoor pollution. However, candles made from beeswax or soy, although more expensive, are apparently safer, because they do not release potentially harmful pollutants.

Cosmetics, parabens and aluminium

A class of preservatives found in some deodorants and cosmetics are called parabens which, in the laboratory, have also been found to have harmful xenoestrogenic properties.



An initial concern in humans was raised following a study in 2004 from Reading University, UK, which demonstrated higher quantities of parabens in the outer part of the breast and within breast cancer cells themselves. Although a direct link with cancer is not proven it did encourage some manufacturers to remove parabens from their products, but in many items such as shower gels and shampoos they can still be seen on the label.

Aluminium salts are responsible for the anti-sweating affect of antiperspirants. A study in 2007 from Keel University created a lot of media activity when it showed higher quantities of aluminium in the upper outer area of the breast in those who used antiperspirants regularly. Aluminium has also been shown to have harmful oestrogenic properties when tested in the laboratory and consequently comes under the classification of metalloestrogens. Users of Aluminium based antiperspirants are understandably concerned that the higher levels in the breast may increase the risk of cancer, although this has not been proven in a study, which would be very difficult to design. Nevertheless, breast cancer specialists also have concerns over oestrogenic chemicals within cosmetics.



In the prestigious San Antonio Breast Cancer Symposium a presentation reported the finding that widely available moisturizers contain parabens and other chemicals which mimic oestriol or estrone, two powerful oestrogen-like compounds that could increase breast cancer risk if absorbed through the skin. They concluded that women with breast cancer should forgo using topical moisturizers, shampoos and shower gels that contain parabens or other oestrogenic preservative, as there is a chance that they may interfere with their treatment and increase the long term risk of relapse.

Non-chemical carcinogens and lifestyle factors

Not all carcinogens are in the form of chemicals yet some of these can be just as harmful to our DNA. Sunlight is a carcinogen, if taken in excess and this has already been discussed on page 92. Other factors are described below:

Radioactivity can arise from a number of sources. Survivors of the Second World War atomic bombs had an increased risk of cancer. However, a study which assessed survivors lifestyle over the period of many years showed that those who had a high intake of antioxidants and avoided other carcinogens successfully reduced their risk. This was an important study because it showed that the risk of cancer



following exposure to one carcinogen can be made worse by exposure to a completely different type (an additive effect). Medical x-rays are also a significant source of radioactivity and although this is small, there should be a good reason to have an X-ray. Another source is radon gas which is naturally released from stones, particularly granite and concerning levels have been found in stone cottages especially in Cornwall. A recent study also recorded increased levels of radon gas in kitchens with granite work surface and advised keeping these rooms well ventilated. If you are worried about radon gas levels in your house there are various agencies which will measure them for you. Acceptable levels are less than 2pCi /L of air, if levels are above this, and certainly above 4 pCi/L adaptations to the house may be advised.

Electricity pylons, power lines and aerials. An Italian court has been investigating the 60 huge steel aerials erected on farmland by the Vatican during the last century to transmit Vatican Radio programs around the World. The courts commissioned a team from the National Tumour Institute and did conclude that there was a connection between the towers and cancer incidents. This included 19 child deaths from leukemia or lymphoma between 1980 and 2003. The risk appeared to be higher in children under 14 who lived less than 7.5 miles from the masts. They also found evidence of a link between the radiation and adult cancers but only among those who lived much closer to the antennae. Consequently, six officials of Vatican Radio have been placed under investigation for manslaughter. This Italian study does not, however, match the finding from other scientists across the world. The University of California, Los Angeles investigated link between electrical fields from improperly laid power lines or kitchen appliances exacerbated children's cancer risk. Although prior studies had suggested a flimsy association between extremely low-frequency magnetic fields (ELF-MFs) and leukaemia, their review of 10 studies, showed no proven link.

A study of 1,397 cancer cases in the UK, published in British Medical Journal, reported that children whose mothers lived close to a mobile phone tower while pregnant did not appear to be at any higher risk of cancer than children whose mothers lived farther away. The team also gathered detailed data about all 81,781 mobile phone towers that were operational during that time. The researchers found that, in virtually every permutation of their calculations, there was no correlation between the towers and the cancer cases. The main author of the paper, John Bithell of the University of Oxford, commented that this was the largest trial in the world of its kind and people living near cell phone towers can be reassured. Other international studies analysed by the World Health Organization (WHO) have found no link between electricity pylons and cancer.



Mobile phones. There have been a number anecdotal reports that heavy users of cell phones have an increased risk of brain tumours caused by the electromagnetic fields and radiation. The WHO, therefore, decided to review the world evidence to find out whether this was true. The decade-long investigation was conducted in 13 countries involving 12,800 people. Researchers interviewed tumour sufferers and people in good health to see whether their mobile phone use differed. They found that six of eight studies found some rise in the risk of glioma (a common brain tumour) and two of seven showed an increase in benign tumours (neurinoma). Despite this,



following a combined analysis, the overall conclusion was that the weight of scientific evidence has not linked cell phones with any health problems. The American FDA also reported that “The best science doesn't show a link between cell phone use and cancer of any kind. No link whatsoever.”

Marriage A study published “Cancer” showed that married cancer patients lived longer than single ones. Data indicated that 65% of married patients survived at least five years after diagnosis, compared with 57% of those who had never been married, 52% of the divorced patients and 47% of widowed. The researcher did not claim that being single was carcinogen but postulated that married patients have a built-in support system and are more likely to stick to their treatment regimens. It is also likely that they may even be in better health to begin with.

Having a desk job. An analysis of 45,000 men aged 45 to 79 appearing in the British Journal of Cancer found that those who had highly physical jobs were 28% less likely to develop prostate cancer than those who spent most of their working lives sitting. The researchers, from the Karolinska Institute in Sweden, concluded, "Findings from this study show that not sitting for most of the time during work or occupational activity and more active living (walking or cycling) is associated with reduced prostate cancer incidence.

Watching TV A study published in "Circulation" described a link between the time an individual spends watching television and his or her risk of death. They tracked the TV-viewing habits of 8,800 adults and followed them for six years. Every hour of daily TV watching increased the risk of dying from any cause by 11% percent. for cardiovascular diseases the increased risk was 18 percent, and for cancer it was 9 percent. The research point out that this effect probably correlated with lack of exercise rather than a direct negative effect of the TV's rays – although more research is needed

Night shift workers Emerging evidence is suggesting that individuals who have an exposure to light at night have a higher incidence of cancer. This largely applies to night shift workers in factories, hospitals and restaurants. The cause is thought to be a disruption of normal circadian rhythm which in turn upsets the excretion of melatonin. The hormone produced by the pituitary gland in the head has an influence on oestrogens and growth hormones.



In conclusion

There are thousands of potential cancer-forming chemicals (carcinogens) in our environment. Some are man-made and others occur naturally. It is impossible to eliminate contact with all environmental carcinogens, even if we recognised all of them. Fortunately, the body is generally pretty good at dealing with small quantities from time to time. The type of risk also varies between individuals depending on their genetic susceptibility and combination with other carcinogen and antioxidants. What is particularly dangerous is either a large quantity over a short period of time – although this is more likely to act as a poison and make you ill – or, more relevant to cancer, regular amounts over a long period of time. The evidence for the harmful effect of anti-perspirants and other oestrogenic cosmetics is anecdotal and indirect but remember many people apply these to their bodies very day from a young age, meaning that their lifetime exposure is considerable. This may not be harmful for most people but women with a family history of breast cancer, for example, may well have greater concerns. A comprehensive list of carcinogens is outside the scope of this book as they would

fill a book on their own! Those with a morbid curiosity can download a list of over a thousand from cancernet.co.uk/carcinogens.htm.

Summary – general advice to avoid carcinogens:

- Steer clear of heavily processed foods
- Avoid foods high in additives, unhealthy fats, salt and sugars
- Avoid reheating fats and oils
- Avoid super-heated snacks such as crisps, chips and cheap breakfast cereals
- Reduce the intake of smoked, barbecued or burnt foods
- Reduce red meat intake
- Limit foods with high AA concentrations from the list above
- Try eating as much raw (healthy) food as feasible
- Stop smoking
- Avoid passive smoke
- Avoid burning paraffin candles

Tips to avoid pesticides, herbicides and fertilizers:

- Buy a good salad spinner
- Soak lettuce leaves and herbs in water thoroughly, then dry before eating
- Wash fruit before putting them into the fruit bowl
- Wash vegetables first and change the water before cooking
- Buy organic foods if possible

Tips to avoid other xenoestrogens and metalloestrogens:

- Avoid petrol and diesel fumes
- Avoid excessive amounts of deodorants and antiperspirants
- Use soap instead of shower gels which contain parabens
- Use glass rather than polycarbonate plastic bottles where possible
- Try not to reuse plastic water bottles
- Rinse soap and detergents thoroughly from cups and dishes after washing
- Avoid storing food in plastic food containers including plastic film